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BROWNE. J.
C

Really a translation
of Boerhaave's Institutiones
See Dedication
[Lindeboom 85]

a.
Clinical
Pathol. Sci.
Med. Diag.
" Therap.
Blood letting

INSTITUTIONS
IN
PHYSICK,
Collected from the
WRITINGS
Of the Moſt
Eminent Phyſicians.

By which the Principles and Fundamentals of that Art are digeſted and fully explain'd, as they relate both to the Theory and Practice; all which are eſtabliſh'd upon the Mechaniſm and Structure of the *Solids* and *Fluids* that compoſe an Human Body;

WITH

An INTRODUCTORY PREFACE to the whole, and a ſuccinct Account of the Authors made uſe of in this Work.

Being a complete Syſtem of what is neceſſary to be known in the Study of PHYSICK.

By J. BROWNE, *LL. M.D.*

LONDON:
Printed by *W. R.* for *Jonah Browne*, at the
Black Swan without *Temple-bar*. 1714.

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TO

Dr. *William Maundy*,

PHYSICIAN to the

Royal Hoſpital at *Greenwich*.

SIR,

AS You recommended this Subject to me, I have us'd my Endeavor to render it intelligible. I confeſs it was a hard Task; yet the Pleaſure I had in doing it, and the Uſe I am perſwaded it will be of, to the Faculty, eſpecially the young Students, makes me amends for the Trouble, but particularly this of paying a publick Acknowledgment *to an old Friend after five and twenty Years intimate Acquaintance firſt contracted in the ſame Univerſity and College, from which time we have both purſued the ſame Studies.*

The learned Phyſician, *I preſume, will not think this an unacceptable Performance, conſidering the Author is very dry and confin'd in his Language, tho' the Subject be ſo copious; ſo that it took almoſt as much Time and Application to tranſlate, as it wou'd have done to have compiled this Work; for a Man may be very well verſ'd in the* Latin, *and yet not take his Meaning right at the firſt or ſecond Reading, which tho' it was a Diſcouragement to the Undertaking, ſeems to me a juſtifiable Reaſon for its appearing thus in* Engliſh.

I know You will pardon ſmall

Faults, if You meet with the true Senſe of this Author in a plain Stile, tho' now and then I am forc'd to make uſe of more Words than he does, which are Words of the ſame Signification; this is done, either to render the Language freer and not ſo ſtiff as otherwiſe it muſt have been, or elſe to explain the Author's Meaning, and make it more eaſily underſtood. I need not mention this to You, (altho' by this I addreſs my ſelf to many) becauſe You have conſidered the matter already; and I flatter my ſelf, You will not be diſappointed in Your Expectations.

Theſe Inſtitutions *of* Boerhauve's *are a Treaſury of Medicinal Knowledge, collected from the moſt judicious Phyſicians; but as they do not, agreeable to the Nature of the Deſign, enter into the Practice of Phyſick, I thought I might without pre-*

prejudice, nay, I doubt not but with ſome advantage, offer them to the Profeſſion in this Dreſs.: For I cannot conceive how ſuch good Notions and ſolid Principles, founded upon mechanical and anatomical Obſervations, joyn'd to Demonſtration with a judicious method directing all to Practice, can in any Language be a Diſhonour to the Profeſſion, altho' the Art was more univerſally known, and better underſtood, than it is at this Day.

I ſpeak now to one who knows the Education of young Students in Phyſick abroad as well as at home, and on which ſide the Advantage lies: I hint not this to the Diſparagement of our own Univerſities, which I ſtand engag'd to; but 'tis a difficult matter for thoſe who are left to their own Studies to put themſelves in a regular method,

thod, they may read till Dooms-day, and not arrive at a tolerable Judgment in the Profeſſion, if they do not apply the Theory to the Practice and the Practice to the Theory; and this for want of knowing how far Anatomy, Chymiſtry and Pharmacy are neceſſary, and how to adapt them properly.

'Tis rambling Work to learn all theſe at ſecond hand, or according to Mode, to go a Courſe of Anatomy, Chymiſtry, Botany, and yet know nothing of the matter, that is not experimentally, either how to work with their own Hands, or how to apply what they have ſeen or read. What uſeful Diſcoveries have we lately met with from the diſſecting Anatomiſt? or what better methods of Cure from all his Diſcoveries? What efficacious powerful Medicine hath the Chymiſt found out for Gout,

Stone *or* Dropſy? *What have all our Botanick* Virtuoſi *diſcover'd to cure a Corn, or eaſe an aching Tooth? If this is not the end of our Enquiries, why do we enquire at all? Why do we not dully tread in the Steps of Antiquity, and never pretend to be better Phyſicians than our Forefathers.*

I muſt not here forget to congratulate Your being plac'd in a Station, wherein You have an Opportunity put into Your Hands of doing Service to Your Queen and Country, by affording ſpeedy Relief to thoſe (otherwiſe miſerable Creatures) who have undergone the Fatigues of a long War, and the Hardſhips of a Sea-faring Life, by which means they have contracted many deplorable and ſtubborn Diſeaſes, which will not yield to common Treatment;

ment; but You have employ'd Your Time ſo well in the experimental Part of Medicine, that You know the great Uſe and Advantage of a valuable one, *and ſuch You are Maſter of. Yet at the ſame time that You avoid the chargeable and (oftentimes) unſucceſsful Rode of the common Methods, yet You purſue the only ſafe and true Way to ſuceed in Phyſick, that is, Obſervation and Experience, by which You arrive at the end the Great* Hippocrates *did alſo,* viz. *to cure* cito, tuto & jucunde.

I am, SIR,

Yours, &c.

J. Browne.

An Introductory Preface.

THE *Art* of *Healing* which is ſo difficult to attain to, ſeems not yet to be ſufficiently adorn'd with every thing, that is neceſſary for the exquiſite Knowledge of a Phyſician, which will appear from theſe two reaſons; firſt, from an imperfect Hiſtory of Diſeaſes, and a Want of faithful Obſervations in every Diſeaſe and every Symptom. 2ly, From clogging the Theory with ſo many uncertain Notions and *Hypotheſis*; for how many almoſt innumerable Opinions have been and are daily broach'd in Phyſick? From whence ariſes ſo many Sects and Diſſentions, that hath not only brought the Art into Contempt among Wiſe Men, but hath produced difficulties in Speculation, and dangers in Practice.

Whoever therefore wou'd ſtudy to advance the Honour of Phyſick, muſt in the firſt place, endeavour to render whatever was difficult, more eaſie, the obſcurer plain, the uncertain fix'd, and the Prolix ſhorter: In order to which he muſt add to Experience and Obſervation, a demonſtrative Way of explaining, what he means with clear Reaſon and due Connection, for the Advantages that ariſe from a well appointed and eaſy Method, in the moſt difficult Sciences that are taught and acquired, is evidently ſhewn to us in *Mathematicks*, *Aſtronomy*, and the new Method us'd in *Botany* of ranging Plants under their ſeveral *Claſſes*.

So that the like may be done in the Art of Phyſick, for if a Method was invented clear, ſhort and demonſtrative, that lays down known *Principles*, and makes the Connection of Cauſes agree with their Effects, it wou'd be eaſie then to diſcover the *Truth* and *Simplicity* of Phyſick, both in Theory and Practice.

But firſt, as it is in other Sciences, we ought to make our *Principles* or *Fundamentals* certain and plain Demonſtrations; becauſe on them we muſt explain the Cauſes of Diſeaſes and the Nature of their *Cures*, which is no more than reaſonable Philoſophy.

What muſt we think then of the ſeveral *Principles*, which have been eſtabliſh'd in all Ages, as the *Baſis* whereon to account for Diſeaſes, and the Art of *Healing*. The Antients introduced the Elements and their four Qualities, from whence they derived their *Temperaments*; others have brought in *Innate Heat*, *Radical Moiſture*, a *Preſiding Spirit*, *Aſtral Powers*, *Nature*, &c. all which have been laid down as Fundamental Principles in the *Theory* of *Phyſick*.

The Moderns who endeavour to refine the Art by Fire, have fix'd their *Principles* upon *Salt*, *Sulphur* and *Mercury*; others again upon *latent*

Seeds, *Idea's*, *Archea's*, *occult Ferments*, &c. but ſome pretend to account for all the Effects of Nature by *Acid* and *Alcaly*; many have formed an univerſal *Pathology*, from a *Triumvirate* of Humours, to wit, the *Bile*, the *Pancreatick Juice*, and the *Pituitary one.*

At this day, when Experimental Philoſophy hath ſo much obtain'd, and the *Phænomena* of Nature are explain'd from the Figure of the *Particles* their Size and Situation; there are many will derive all the Cauſes of *Diſeaſes*, from *Acrimony*, *Viſcidity*, and *Bile*; but what Succeſs there hath been in any of theſe Opinions Experience proves; for this way of learning the Knowledge of Phyſick, hath been the occaſion of the wide Difference and Contradictions to be met with amongſt Phyſicians: For 'tis evident, where things are not generally agreed on, we have juſt Reaſon to ſuſpect, that the *Truth* is not yet found out, or at leaſt not brought to Light.

Some have founded their *Principles* upon an *Entity*, which does not only produce natural Actions, but acts beyond Nature, and alſo frees the Body from *morbifick Cauſes*; but we aſſign the Cauſe of Action to be quite different here, and that it is perform'd without the Concourſe of an *Immaterial* and *Ideal Entity*, but only by *Corporeal Motion* and *Impulſe*: And this it is, this ſame Motion or Determination of Action that diſpences Life and Health, procures Diſeaſes and reſtores to Health again, according to the different degrees of Motion in time and place.

Theſe things are not placed in the Power of the Soul, but are evidently ſeparated from it, as Experience daily teaches for the Motion of the Body, the vital Parts, Health and morbid Diſpoſitions are not the Effects of the Soul, but things rather depending on meer corporeal Cauſes, as *Air*, *Diet*, *Motion*, and the Structure of the *Solids*, which vary according to Age and *Conſtitution.*

Notwithſtanding all this, thoſe very external and meer corporeal Cauſes, which diſpoſe the Motion of the Blood, and modifie all the natural Actions after different ways, has a great Influence on the Soul it ſelf, by conſtituting and ordering its *Functions*, *Inclinations* and *Manners*; the Functions and Operations of the Soul being different from thoſe Motions which preſerve Life and Health, and produce Diſeaſes; in a Word from the Motion and Texture of the Blood, by which we have a curious Natural and Geographical Obſervation, that as there are different Situations or Regions to the *Poles* or to the *Æquator*, ſo Men,according to the Structure of the Body, Strength, Diſpoſition of Diſeaſes, long Life, Fruitfulneſs, *&c.* have their Wills, natural Inclinations, Vices and Manners diſtinguiſh'd.

But tho' the *Soul*, whoſe Duty it is to perceive, direct and make a Judgment of the ſeveral Motions of the Body among one another, and from thence to form Impreſſions and *Idea's*, does act differently in *Cogitations*, by Virtue of that Union between *Soul* and *Body*, this kind of Motion of the *Soul's* is liable to be diſturbed and moleſted ſeveral ways, as by the many *Phantaſms* and Paſſions of the Mind; notwithſtanding which, the *Soul* does neither directly nor proximately move the *Fluids* of our Body, and perform *Secretion*, *Excretion* and *Digeſtion*; for which reaſon it can never be admitted as a *Fundamental.*

A *Fundamental Principle* ought to be Natural, and therefore Mechanical, ariſing from *Matter* and *Motion*, or the Diſpoſition of Body to *Motion*: For all Actions, as in the *Macrocoſm*, where all things are diſpos'd in Order, ſo they are in the *Microcoſm*, a *Species* of *Motion*, and the Cauſe of them only to be found in *Motion.* But it is evident to Reaſon as well as Experience, that *Motion* is *innate* to all Bodies, but that the ſubtiler Bodies are ſwifter, and the ſolider move with greater force, by which means one acts upon another.

But thoſe Motions which are perform'd in certain Order, certain Proportion, and certain time, are regular Motions, and only depend on the Artificial Structure, Diſpoſition and Proportion of the ſolid and fluid Parts to Motion, which being alter'd by external and mechanical Cauſes, make Irregular or Diſeas'd Motions, which being reſtored by Diet and Medicines, are reduced into Order again.

Therefore *Hippocrates* wiſely held, that Nature was the Phyſician and Healer of Diſeaſes, that the Soul never ought to be admitted as the Foundation of any thing in Phyſick, and what the Antients aſcrib'd to Nature we do to the Structure of the *Solids* and Motion of the *Fluids*.

Hence an univerſal Principle may be eſtabliſh'd, from whence the Actions, as well Natural as Preternatural, may be accounted for from this Spring, as from a Fountain Head; and all thoſe things which happen in the Cure of Diſeaſes and the Operation of Medicines. For the Motion of the Blood depends on the Motion of the *Syſtole* and *Diaſtole* of the muſcular and moving Fibres, as alſo on the Temper of the *Fluids* and their Quantity. But the Motion and Impulſe of the *Solids* is no *Immaterial Ideal Entity*, but the moſt ſubtil material one that can exiſt, and this is that *Catholick Fluid*, which is the moſt active from its *Elaſticity* or ſpring of ſubtil etherial Air, which the Antients call'd their *Anima Mundi*, we the *Breath of Life*.

For as this *Subtil Elaſtick Air* is exhaled or drawn off from the Juices of the Body, ſo Life periſheth; a vitiated Air diſturbs both the Body and Mind, in the Performance of their Functions; therefore it is, that from a ſerene and pure Air the Body enjoys longer Life, and is leſs ſubject to Diſeaſes; nay, it is more eaſily relieved and cured in the moſt difficult Diſtempers, to the better Underſtanding of which, I ſhall premiſe two or three things briefly, concerning *Life* and *Death*, *Health* and a *Diſeaſe*, on which the whole Structure depends.

Life in the Organical Body does not properly and ſingularly denote its healthful and uncorrupted State, but as it hath been received in all Ages, it imports a certain Action, which in Phyſiology is no other than Motion.

Therefore *Life* is a conſtant Progreſs of the *Fluids* by certain Pipes or Veſſels, aſſiſted by the Impulſe of the *Solids*, preſerving a corruptible Body from Decay; ſo long as ſuch a Motion is in being, ſo long a Part or the whole Body is ſaid to live, and is free from Corruption; but as this Motion is interrupted ſo as not to be reſtored, the Body is ſaid to be dead; but ſo, that Corruption and Putrefaction does not immediately follow; as we ſee in Perſons ſtrangled, and thoſe who are ſuffocated with Water, or that periſh with Cold, whoſe Hearts or great Veſſels are fill'd with Blood that ſtagnates there.

But if Death enſue from the Violence of a Diſeaſe, this proceeds from a deficient Motion of the Blood, upon which there immediately follows a Diſpoſition and Tendency to Putrefaction; ſo that it can ſcarcely be imagined what Corruption exhales from Bodies in Fevers and the like; for this Motion of the Blood preſerves the whole Body from a State of Corruption, which it would otherwiſe be ſubject to.

And altho' this Motion be circular, it is alſo inteſtine, which ariſes from the Motion of the ſpiritualizing Parts, which defends the Blood and all the *Fluids* of the Body from another Action of external Air, and gives it a different Texture. For by means of the Reſiſtance of this inteſtine Motion, ſpirituous Liquors and generous Wines are converted or chang'd by the Fluid of the Air into a vapid and inſipid Body. Beſides the Progreſſion and Preſſure of the Blood thro' Strainers of different kinds, ſeparates not only the ſubtil, airy, active Element, but alſo the ſerous, impure, ſaline, ſulphureous Parts, which of their own Nature break through and tend to Corruption, for ſo long as the *Fluids* are kept in Motion, ſo much leſs are they ſubject to be broken.

Having given the reaſon of *Life* and *Death*, it follows from the ſame Spring, to wit the Motion of the Blood, that we ſhould explain the Nature of Health, which does not ſimply conſiſt in the circular Motion of the Blood, which is alſo in Sickneſs; but it is found in a certain Order and Regularity of this Motion, in a moderate and free Progreſſion of the Blood, aſſiſted by the Pulſation of the Heart and the very Tone of the Fibres, or from the Equality of the Motion of the *Solids* and *Fluids*.

This Equality governs all Actions according to that Order and Law, that was firſt appointed by the great Creator; in perfect Health, the Soul reaſons right, the Senſes are vigorous, the vital Motions neceſſary, Secretions and Excretions are duly perform'd by their proper Emunctories, Sleep, Appetite, Digeſtion and Nutrition, are all natural and pleaſant.

But how this regular Motion of the Blood affects the Government of the Body, we ſhall more particularly enquire into: There are three Sorts of Parts in Animal Bodies, the *Movers*, the *Parts moved*, and the Way or Veſſel by which there is a Motion of the Fluids: The *Movers* are the Heart and muſcular Fibres of the whole Body, made up of ſenſible Membranes, and fleſhy or carnous Threads, ſtrengthen'd by the Fluid of the Elaſtick Air in the Blood, which the Antients call'd *Spirit*; theſe animated Fibres as I may call them, fitly adapted for Motion by their Conſtriction or *Syſtole*, impel the Fluids of all kinds thro' their Veſſels, and theſe moving circularly, ſupport and nouriſh the particular Parts of the Body; the *Part moved* are the *Fluids*, the Blood with its *Serum* and *Lympha*, together with whatever Humours ariſe from them; the Ways by which they move one way or the other, are firſt the Arteries, which bring Blood from the Heart as the Fountain or firſt Muſcle of Motion, then the Veins and lymphatick Veſſels, which convey Blood and *Lympha*.

Now every Man may eaſily conceive, how a moderate and free Motion of the Humours, requires a moderate and equal Impulſe of the *Solids*; that is, not too ſwift and violent, nor too ſlow and weak, but which keeps Proportion by juſt Intervals; from hence a proportionable Quantity of Humours is required for the Veſſels and for the Strength of the Fibres; beſides this, a due Proportion of Elements, ſuch as are neceſſary to temper the *Fluids*, which compoſe the Blood: Again, the Paſſages or Veſſels ought to be free, that the Blood may paſs thro' them without hindrance.

If all theſe Things are diſpos'd right, the Motion of the Fluids through the Canals and Ducts of the whole Body will be regular, ſmooth and equal, which is the Perfection of all Actions, that are perform'd in us according to Nature. But becauſe the impelling Parts or moving Fibres to impulſe, particularly relate to the Circulation of the *Fluids*, it will be neceſſary that we form to our ſelves clear and diſtinct Notions concerning this Impulſe and Motion; *viz.* that we aſſign the firſt Place to the *Heart*, as the *primum mobile*, the Prince of the Muſcles, the firſt Impeller, and conſequently the Fountain of Life.

This Noble Muſcle triumphs over all the reſt, as having two different Motions, upon which all the others depend, the one is active from the *elaſtick Fluid*, exiſting in the Fibres, which is call'd the *Syſtole*, for by this means they are contracted and ſtraitned, and ſo the *Fluids* lodging in their Cavities are propell'd and driven forward, the other Motion of the Heart, to wit, its *Diaſtole* is paſſive, becauſe the Fibres are relaxed and dilated from the Impulſe of the Blood into its Cavity: Therefore the Blood is received by one Motion, and expell'd by the other, from the Blood's being puls'd out of the Heart, the Arteries are dilated, but contracted from the proper *elaſtick Fluid* of the Fibres, by which they protrude or thruſt forward the Blood into the Veins; but the Dilatation of the Arteries from the Blood being impell'd into them from the Heart, is by the Phyſicians call'd the *Pulſe*, by way of Eminence or Diſtinction, for you can ſcarce perceive the *Syſtole* by any Senſe of feeling.

Beſides this *Pulſe* and *Motion* of the Arteries, the venous, arterial and lymphatick Ducts are confirm'd by that Motion, which exiſts in every Species of the *Syſtole*, and is call'd the *Tone*, as the turgid Fibres in the elaſtick Fluid of the Nerves and Blood, not only promote the Circulation and Progreſſion of the Fluids by their Strength and Retenſion, but by a certain ſubtil Impulſe; again, the Fibres are alſo confirm'd in the *Motion* of the *Diaſtole*, which is made from the Impulſe of the Blood by the Heart, extending and dilating the Fibres, which if the other cannot reſiſt, to wit, the *Tone* and Strength in the Muſcles, the Expanſion of the Fibres is then beyond their Spring, and the Progreſſion meets with an Impediment.

Therefore theſe two kinds of Motion, *viz.* a *Pulſe* which exerts its Power in the Veſſels and the Heart, and drives from the Centre to the Circumference, and the *Tone* which is ſeated in all the Fibres, membranous and muſcular Parts, and moves from the Circumference to the Centre; if theſe are in a right State and in due Strength, Equality and Temperament, the Blood is received into the Parts equally and without Impediment, and from the ſame, a due Quantity is expell'd in due time, the Secretions naturally follow, and ſo the Buſineſs of *Health* is perform'd.

A Conſtitution or Temperament of Body, phyſically conſider'd, is nothing elſe but a particular or diſtinct Motion in different Perſons; for when the Blood is ſwiftly and violently moved, and is too fluid: This, acccording to the Antients, was call'd a *cholerick Conſtitution*; if leſs fluid and the Motion ſlower, *melancholick*; if weak and languid abounding with ſerous Blood, *flegmatick*; if the Blood was too plentiful and mov'd briſkly thro' the Veſſels, then *ſanguine*.

This Variety of the Motion of the Blood depends not ſo much on the Quantity and Size of the moving Fibres, but on their Strength and Vigour; and therefore conſequently on the *Pulſe* and *Tone*; in the next place, it depends not on the Subſtance and State of the Blood, the Plenty of the Veſſels, their Capacities and Condition; but as an hereditary Diſpoſition, Age, Sex, Climate or Air variouſly affect and alter this Temperament of Humours, the Contraction of the Fibres, the Strength and Habit of the Veſſels, ſo the Motion of the Blood differs, that it is never one and the ſame in the ſame Man, at all Times of the Year, under all ſorts of Diet, and in every Climate.

But becauſe the Motion of the Blood is ſo various in various Perſons, hence is obſervable, that Difference in Conſtitutions, as to Appetite, Excretions, Pulſe, Strength, morbid Inclinations, Diſpoſitions of the Mind, and other things of the like nature.

Having ſuccinctly explain'd the Reaſon of *Health*, it will be eaſy to deſcend into the Origine and Cauſe of Diſeaſes; for the ſame fundamental Principle from which we deduced the reaſon of the former, may ſerve for an Explanation of the latter. For as the very *Being* of *Health* conſiſts in a moderate, free and equal Motion of the Blood, or in the Equality of the *Pulſe* and *Tone* of the juſt Temperament and Quantity of the F*luids*; ſo the Seat of every Diſeaſe, and the immediate Cauſe thereof, is placed in the Motion, as it is immoderate, obſtructed or unequal, by reaſon of the loſt Diſtinction of the *Pulſe* and *Tone* of the *Solids*, as alſo the Intemperament and Diſproportion of the F*luids*.

Health is formally the Uſe or Exerciſe of all regular Actions, but in a *Diſeaſe* this Exerciſe is either leſſen'd, interrupted or totally deſtroy'd, for there is none, in which either the vital, animal or natural Actions do not ſuffer. Hence it is, that in every Diſeaſe, either Appetite, Digeſtion, Pulſe, Reſpiration, Nutrition, Senſe, Reaſon, the Secretions or Excretions are wanting: But as the ordinary Motion of the Blood directs its Actions neareſt to Nature; ſo on the contrary, the inordinate Motion is the Parent of all irregular Actions in the Body; for a diſorder'd Motion attends all F*evers*, *Inflammations*, *Hemorrhagies* and *Spaſms*, and a changeable Pulſe, Alteration of Heat and Coldneſs, a Collection of Blood in any Part, vicious Excretions are the

Signatures. For the Parts are too hot or too cold, the Body too much contracted or relaxed, the Excretions too plentiful, not enough, or elſe irregular, the Pulſe too quick or too ſlow, Reſpiration increas'd or abated; theſe things ſufficiently ſhew a diſorder'd and anomalous Motion of the Blood.

Beſides, there are chronick Diſtempers where the Motion of the Humours are obſtructed, and where a Relaxation of the Fibres does not attend, and this is plainly demonſtrated in Tumours, Extravaſation of the Fluids, and the Suppreſſion of neceſſary Excretions: And this may be derived partly from a loſt Tone of the ſolid Parts, and partly from an undue Proportion and Mixture of the Humours: The Motion of the muſcular Parts makes up both the *Syſtole* and *Diaſtole*; the *Syſtole* is injured when it is too ſtrong, violently contracted or wound up ſo as to force the Spring, and then it is call'd a *Spaſm*, or rigid Contraction: The *Diaſtole* is hurt, when it is dilated beyond its natural State, and then there attends it an Inability to Action from its Relaxation or Weakneſs.

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THE INTRODUCTION,

Containing the Riſe, Progreſs, and Succeſs of Phyſick.

WHoever can exerciſe the proper Actions of Life with Eaſe, Pleaſure, and for ſome Certainty of Time, may be well eſteem'd a ſound or healthful Man; and it is this State or Condition only that deſerves the Name of *Health*: But if he cannot perform theſe things, or at beſt does them with Trouble, Pain, and Wearineſs, the ſame may be call'd a *ſick Perſon*, and the Condition he is in, we are us'd to term a morbid State or Diſeaſe.

But Injuries from Accidents and the unavoidable Viciſſitude or Change of things, which are always neceſſary, as Air, the Quality of Meat and Drink, the Force of external Bodies, the Actions of Life, and laſtly, the Fabrick or the Compoſition of Human Bodies have render'd Diſeaſes coequal with Mortality, as long as we enjoy Life under the Neceſſity of that Law. Indeed Diſeaſes by a mechanick Impulſe force the Body to apply ſome Relief in Men as well as Brutes, tho' Reaſon cou'd never yet direct us into the manner of it; which would otherwiſe be unknown; which by Obſervation we find to be true:

The troubleſome Perception we feel in ſome Member or Limb being obſtructed in its Motion, or the Pain and Torment we perceive in ſome Part hurt in its Action, ſtrikes the Mind with a Deſire to ſeek for, and apply ſuch apt and proper Remedies as may remove its Grievances, either from uncertain or confus'd Experience, or ſomething it is prompted to, by natural Inclination.

This at firſt gave Birth to the Art of Phyſick, and this with daily Improvements was always and in all Places amongſt Mankind: But the Monuments of Antiquity, as well ſolid as fabulous Hiſtorians inform us, ſuch as *Herodotus*, *Strabo* and *Pliny*, that the *Aſſyrians*, *Babylonians*, *Chaldeans* and the *Magi* firſt cultivated this Art, in order to cure the preſent and prevent future Diſeaſes. Hence the Art ſpread it ſelf according to *Homer* in his *Odyſſes*, and *Diodorus Siculus* into *Egypt*, then as *Herodotus* writes into *Lybia Cyrenaica*, from thence to *Greece*, as *Hippocrates* witneſſeth, where it firſt flouriſhed in the Iſlands of *Cnidos*, *Rhodes*, *Coos*, and *Epidaurus*.

The firſt Foundation of the Art was built upon Chance, natural Inſtinct, or unforeſeen Events, which was afterwards improv'd; firſt, from Memory, or the Recollection of what Succeſs they had from former Experience. 2ly, From deſcribing the Diſeaſe, Remedy and Succeſs, which, as *Pauſanius* takes notice, was wrote upon the Columns or Pillars, *Strabo* ſays upon Tables or on the Walls of the Temples. 3ly, From the Deſcription or Account of the Sick themſelves, who, both as *Herodotus* and *Strabo* mention, were expos'd in the Streets and the Market Places, to ask of any that paſs'd by if they knew of any Remedy that wou'd cure them, as likewiſe to adviſe them to the Uſe of it. 4ly, From Reaſoning, and comparing of Obſervations with what was preſent, and what cou'd be expected hereafter, which is call'd the Analogical Part.

Hence the Art aroſe to a greater Perfection, firſt from the Application of the Phyſicians, as *Ariſtotle* obſerves, as well to certain Diſeaſes, as to particular Remedies. 2ly, From the accurate Annotation of Diſeaſes: 3ly, The exact Obſervation and Deſcription of Medicines and their ſingular Uſes. But this preſently got into certain Families and among the Prieſts, who made no ſmall Profit and Advantage of it to themſelves; and this ſoon put a Stop to the Progreſs and further Advancement of Medicine at that time.

The examining the Entrails of Beaſts by the Prieſts; the Method of embalming and preſerving of Dead Bodies, even the killing of Meat for the Shambles, have much promoted the Knowledge of the Structure of a ſound Body, the ſecret and hidden Cauſes as well of Health, Diſeaſes, and even Death it ſelf; laſtly of all, Live Diſſections of Animals in uſe amongſt the ancient Philoſophers, as *Hippocrates* writes in his Letters to *Damagetus.* 2ly, Lectures or Readings upon the diſtinct Cauſes of Diſeaſes, their Riſe, Increaſe, Heighth or Strength, Declination, Period, Change or Effects. 3ly, The Knowledge of Medicines, their Choice, Preparation, Application, known Virtues or Obſervation upon their Effects, ſeem to have render'd the Work perfect.

But *Hippocrates,* who was contemporary with *Democritus,* and who was perfectly vers'd in all theſe things mentioned as neceſſary to the Art, and having added thereto his own judicious Obſervations, compiled there from a Body of Greek Phyſick, becauſe as he underſtood the Emperical and Analogical Parts, and being an exquiſite Philoſopher, he eſtabliſh'd to all ſucceeding Ages, that which is call'd the dogmatick Phyſick.

Which continuing a long time among the Deſcendants of *Æſculapius* uncorrupted, was at laſt digeſted into one common Body by *Aretæus* the *Cappadocian*; which being in various Parts, was by diverſe Artificers at different times, according to the Succeſs of things accurately wrought up, at firſt in the Alexandrian School, 'til at laſt it came to *Galen*'s Hands, who collecting the ſcatter'd Pieces, digeſting the confus'd, and explaining all the reſt by the peripatetick Dogma's or Opinions, he enrich'd himſelf, but impoveriſh'd the real Art of Healing, by adding more Difficulties thereto, and clogging Medicine by his ſubtle Innovations of Elements, Cardinal Qualities, and the four Humours.

But the Memory of theſe things being almoſt worn out with other Arts in *Europe* after the Sixth Century from the Ninth to the Thirteenth, Phyſick was more ſubtilly improv'd by the Arabians in *Aſia*, *Africa* and *Spain*, whilſt the *Materia Medica*, the ſeveral Preparations thereof and Chirurgery received many Additions and Corrections from them together; but tho' the Faults of *Galen* were rather cheriſh'd and improv'd than baniſh'd from the Art, yet every body follow'd them, 'til by Emendations and Refutations, there was a Medium fix'd upon betwixt the Two Extremes, and the Diſcipline of *Hippocrates* gain'd a mighty Reſtoration by the French Phyſicians, who added thereto Chimical as well as Anatomical Experiments; 'til the Immortal *Harvey* by his Demonſtrations that overturn'd all the Theory of thoſe that went before him, laid a new and almoſt certain Baſis to make Phyſick a *Science*. Hence at this Day, it is rever'd as free from all Sects, whilſt it is promoted and improv'd by certain Inventions or Diſcoveries, in Anatomy, Botany, Chimiſtry, Philoſophy, Mechanicks, and the Productions of Art which is made uſe of in the various Experiments. From whence laſtly it follows; firſt, that the antient Art of Medicine depended ſolely on the faithful Collection of Obſervations. 2ly, That they employ'd their Faculties in exploring the Cauſes of Experiments, and enter'd into a large Field of Argumentation, or Diſputes about the *Rationale*; ſo that, 3ly, the firſt Part was not ſo fallacious, but always appear'd the ſame from Evidence, Uſe and Neceſſity, but the latter was doubtful, uncertain and changeable, being liable to be controverted or evaded by the Variety of Opinions in every different *Sect of Philoſophers.*

The Principles and Parts of Phyſick.

FRom the uſeleſs and fallacious Part this *Science* receiv'd many things, which as they are to be rejected and thrown aſide, we are to conſider, the whole Scope or Deſign of this Art is to free or deliver us from Pain, Sickneſs and Death; and conſequently is inſtituted for the Preſervation of preſent Health, and the Reſtitution of that which is loſt; and therefore whatever is to be learnt and perform'd by the Phyſician, is to anſwer this End. For the Life, Health, Diſeaſes or Death of Mankind is the Object thereof; the Cauſes thereof, from whence they proceed, and the Means by which they are govern'd: From whence Medicine becomes the *Science* or Knowledge of thoſe things, from the effect of which Applications a healthful State of Life is continued, and the Sick reſtored to their former Condition; ſo that the Nobility, Uſefulneſs, and Neceſſity of this Art naturally diſcover themſelves.

The ſolid Fundamentals or Principles are to be diſcover'd two ways, to come at a Certainty: firſt, from an accurate Obſervation of thoſe *Phænomena*, which appear in Health, Sickneſs, Death a Cadaver, or elſe to the external Senſes; whether they ariſe from what is in the Man himſelf, or from thoſe things which act upon him by external Cauſes, Accident or Art. 2ly, From a ſevere or exact Scrutiny into thoſe things which lie hid from our Senſes, or are perform'd for ſome certain End. But theſe things can only be obtain'd by correct Reaſoning, while the Experiments laid down, are diſtinctly examined in all their ſeveral Properties, from thence diligently compar'd among themſelves, as agreeing or differing, while at the ſame time they are faithfully ſet down, that we may be able afterwards to find out what appear'd plain and evident therein; and in this particular, thoſe of the preſent Age are not leſs to be depended on than Antiquity.

Therefore that what is enquired after, may be diſcover'd from what is laid down; certain Principles are requiſite, the Knowledge of which amounts to a Demonſtration; which Reaſon requires ſhould be diſtinct, clear and certain: Such are thoſe which being purely corporeal in Man,are only mechanical and phyſical Experiments; for theſe explain to us the general and particular Force and Operation of Bodies. But ſince there are in Men other things which cannot be underſtood by thoſe Principles, and therefore not to be explain'd by Demonſtration, it will be neceſſary to uſe our utmoſt Reaſon, if we wou'd avoid Miſtakes, but he may eaſily ſee that,that conſiders the following things otherwiſe demonſtrated, and admits as Truths.

Firſt, That Man is compoſed of Soul and Body united. 2ly, That theſe two Natures differ from each other; and 3ly, That he hath a Life made up of different Actions and Paſſions: 4ly, That theſe ſo act among themſelves,that the ſingular or particular Thoughts of the Mind are joyn'd to the determinate Conditions of the Body, and ſo *vice verſâ.*

5ly, While ſome Thoughts follow from one ſimple Thought alone, others are only derived from the alter'd State or Condition of the Body: 6ly, Likewiſe contrary to theſe Operations, ſome make a certain Motion in the Body without Attention, Self-conſciouſneſs or a Command of the Soul aſſiſting them as a Cauſe; but there are none raiſed by the progreſſive Actions of the Mind, as long as a Man is in a healthful State; laſtly, ſome Concretes or Complications are obſerv'd from both theſe. 7ly, Whatever involves the Thought of Man, that only is to be aſcrib'd to the Mind, as the Author or Beginner. 8ly, But that which procures Extenſion or Motion, that is applicable to the Body only, and its Motion as the Producer of it by its Properties, and ſo ought to be underſtood, explain'd and demonſtrated. 9ly, Neither can Reaſon fathom from the cleareſt Nature of the Mind or Body, ſo far as yet is known to Human Underſtanding, what things can act or be acted upon mutually with each other.

The utmoſt or laſt Reſult of Metaphyſical and Philoſophical Cauſes, inquir'd into by the Phyſicians, are not neceſſary, uſeful or poſſible. So that he ſhou'd make Elements, or eſtabliſh the Origin of the firſt Form of Seeds and Motion, but he may profitably apply himſelf to all things that are demonſtrable in Anatomy, Chimiſtry, Mechanicks and natural Philoſophy, ſo far as relates to the ſimple Events of Facts. Then he ought to begin with things that are moſt plain, eaſy to be known and moſt certain, from which always going forwards with thoſe which are in the next Degree, he may make ſuch an accurate Progreſs, as to be able to find out ſuch things as are more complicated, obſcure and difficult. So let him proceed inſtructing from Generals to Particulars, 'til he ſo explains his Diſcoveries, that the Inventor may proceed from

Particulars to Univerſals; on all which, method will depend. firſt we are to enquire into Life, then Health, next Diſeaſes, and laſt of all Medicines whereby they are cured.

Therefore the firſt univerſal Doctrine in Phyſick is what we call *Inſtitutions*, and this explains, firſt the Parts or Fabrick of a Human Body; 2ly, Life: 3ly, Health: 4ly, The Effects which naturally follow, and this is call'd the Phyſiological Part, the Human Oeconomy, or the Doctrine concerning the Uſe of the Parts; but the Objects of this Part, as they are reckon'd in Method are uſually term'd, the Naturals, or thoſe which appear according to the Courſe of Nature.

The next Part hath relation to the living Body, as firſt, Diſeaſes: 2ly, The Difference of Diſeaſes: 3ly, Their Cauſes: 4ly Their Effects; which is called the *Pathology*, becauſe it treats of Diſeaſes, or the *Pathological Aitiology* when it treats of its Cauſes *Pathology* or *Noſology*, if concerning the Differences thereof: Or laſtly, Symptomatiology as often as it explains the Effects thereof. The Objects of this part, are thoſe things which are preternatural or contrary to Nature.

The third Part teaches us the Signs of a Diſeaſe, and how they are reduced to Uſe; either in a healthful or ſick Body, as to what the State or Condition is, was, or will be, the Degrees, Order and Effect of Health or Sickneſs, and this comes under the Denomination of the Seimeiotical Part; the Objects of which are the things call'd Natural, Non-natural and Preternatural.

The Fourth ſhews us the Remedies and their Uſe, by which Life and Health may be maintain'd, from whence it is term'd *Hygeinial*, and hath for its Objects the Non-naturals.

Laſtly, The Fifth Part inſtructs us in the *Materia Medica*; the ſeveral Preparations of Medicines, and the manner of uſing them in order to reſtore Health, and free us from Diſeaſes: This is call'd the Therapeutick Part of Phyſick, containing the Diatetick, Pharmaceutick, Chyrurgick and method of Cure. Therefore we ſhall proceed according to this Order laid down and begin with the Phyſiological Part.

Of Phyſiology.

THE Human Body is compos'd, as Anatomical Enquiries teach us, of Solids and Fluids: The Solids are, either Veſſels that contain the Fluids, or Inſtruments ſo formed, configurated and connected, that certain determinate Motions may be perform'd or exercis'd from this ſingle Fabrick, if any moving Cauſe concur. For there we find Supporters, Pillars, Clothing or Covering, Partitions, Rollers, Wedges, Leavers, Pullies, Cords, Preſſes, Bellows, Sieves, Strainers, Canals and Receptacles. The Faculty of exerciſing theſe Motions is call'd a Function, which is agreeable to the Laws of Mechaniſm, by which only it can be explain'd.

The Fluids as mention'd before, are contain'd and mov'd within the Solids, and in Motion are determin'd, mix'd, ſeparated and chang'd; the Veſſels move with the Inſtruments tyed to them, the Sides of which rub againſt each other, change, and return to their Place again. Theſe Actions are perform'd according to the Hydroſtatick, Hydraulick and Mechanick Laws, and therefore ought to be explain'd thereby; yet ſo that the moſt accurate Reaſon may be given of each Humour and every Action, that can be required in any kind of Experiment.

By the Nature of Human Life, to be underſtood here according to common Acceptation, I mean ſuch a Condition of the Body, as to Solids and Fluids, as is neceſſary at all times to maintain and carry on a mutual Commerce betwixt the Soul and Body, ſo that it may continue after ſome ſort or another, or may be reſtored in ſome meaſure; neither is it neceſſary to be wholly broke or interrupted: But I will not pretend that this is a true Definition of Life, or that I cannot give a clearer Idea of Health than what is laid down before.

But that we may nicely underſtand, what is requiſite in the Body, that theſe Two may ſubſiſt together. Firſt, We are to make a curious Collection of all the Phænomena of Life and Health. 2ly, Enquire into the Subjects in which theſe are. 3ly, Examine the Cauſes from whence they proceed. 4ly, The Inſtruments by which they are made; and 5ly, The Effects which they do produce again.

But ſince theſe are almoſt innumerable, for Method ſake we ought to reduce them to certain Heads, that we may treat diſtinctly of each of them in order. But firſt let us begin with Corporeals, which are common to Man and Woman, or proper to either; and ſince all things ſo cohere amongſt themſelves, that they move as it were in a Circle, cauſes and effects acting by mutual turns, whence ariſes an unavoidable difficulty to find out the order thereof, without tranſgreſſing the Method.

Yet the beſt appears from beginning with the *Aliment* taken in, and then going forward through the ſucceſſive changes of thoſe things in the Body, till it ends where theſe very things make the Body it ſelf, and its Actions; for how the Body exiſts, or is ſupported from the things it receives, firſt known to ſenſe, and continually chang'd, and how it acts by the ſame, will be moſt eaſily and clearly diſcover'd after this manner.

The Aliment or Food therefore, is either ſolid or liquid, and conſequently either eatable or drinkable; the primæval matter of which was Water, and from that, what Earth ſpontaneouſly produced, as ſacred, profane and fabulous Hiſtory inform us, nay as we may diſcern from the very nature of the thing it ſelf: Afterwards the Blood of certain Animals, and other parts of them were uſed to be prepar'd or dreſs'd together, with ſuch eatables as the Earth afforded; while many, as *Herodotus* ſays from all Antiquity, liv'd only of Vegetables and Water, which ſome do to this day; and whole Nations have been contented to live thus: But *Tulpius* tells us, he ſaw a Man that liv'd of Graſs and Hay: Others feed upon Fiſh only, ſome Fleſh and Milk, while others eat all kinds of things, as Fiſh, Fleſh, Fowl and Reptiles, which Luxury and Gluttony have brought into vogue, and which in all Ages of the World hath been practiced. Therefore with every one of theſe things alone or mix'd, crude or prepared, raw or dreſs'd, the Man that uſes them lives, grows and is refreſh'd: Neither does the variety of Aliment produce any great difference to the nutrition of the Body, either as to matter or action, what then is the faculty in a healthful Man, which from changing ſuch varieties can conſtitute a Human Body?

Nevertheleſs, the uſe of things teaches us this change is better perform'd according to the variety of the Food, or the difference of the Preparation from whence theſe were ſubject to alter before they enter'd the Body. Hence ripe Corn, dreſs'd and ground, mix'd with Water fermented and boil'd by the Fire, is beſt for the preſervation of Health: So the parts of Animals after being clean'd, dry'd, pickled, boil'd, roaſted, broil'd, or the like, experience teaches us are fitter for uſe; Salt, Vinegar and Spice afford us the particular Materials for Sawce, and are the Baſis of all Pickles or other Preſervatives for Meat.

Summer Fruits, if ripe, that is ſoft eaſily melt or diſſolve, ſo that they need no other preparation or aſſiſtance. But Drink if from a pure Water and running Stream is beſt crude or raw; if the Water is foul from Inſects, or their Eggs floating therein, gently boiling or letting it ſtand for a time renders it better; but Drink made from Corn or Fruits boil'd in Water is known to be good: As that which is made from Malt, by ſteeping in Water, then boiling, fermenting and fining it down, which we call Ale or Beer; neither is the reaſon leſs clear and evident from the making of Cyder from ripe Summer Fruits preſs'd, then fermented or work'd and afterwards fin'd, which hath been ſo extoll'd by the celebrated Name of Wine: from all which Preparations proceed, attenuation, dilution, lubricity, fluidity, the ſeparation of the thin from the thick, and conſequently we may naturally conclude the ſeparation and excretion of the fluids is eaſier perform'd in the human Body.

Of Manducation or chewing of Victuals.

THE Food being thus chang'd as hinted before, ſtill undergoes further Alterations in the Mouth, which are made firſt from biting: Secondly Maſtication: Thirdly a Mixture of Air with the Mucous and Saliva: Biting requires the Opening or Abduction of the Inferior Jaw from the upper towards the Throat, directly upon the Condyliforme Proceſs, under the prominence or riſing of the temporal Bone, by the help of the Ligament and Interpoſition of the cartilaginous Lamella articulated thereto, as *Veſalius* hath deſcrib'd it. And in the next place, Biting requires a ſtrong Compreſſion of the lower Jaw againſt the upper; ſo that by the Teeth being plac'd betwixt, the Food may be cut or ground.

The Firſt Action is perform'd by the Contraction of the Biventrian Muſcles, according to *Caſſerius*, which ariſing carneous from a ſmall Trench indented or ſunk into the *Baſis* of the *Maſtoide* Proceſs, deſcending as *Veſalius* ſays, they make a Tendon, from whence they paſs by the *Stylohyoide* Muſcle and the Annular Ligament, cleaving to the ſide of the *Os Hyoidis*, from whence they become carneous again, and being ſupply'd with fleſhy Fibres from the very *Os Hyoidis*; they aſcend even to the very inward middle and lower part of the Chin, and are there inſerted: So that by this piece of Mechaniſm the Strength and Direction or Tendency of theſe Muſcles are underſtood, not without great Admiration at the artful Fabrick.

The latter Action which conſiſts of bringing the Jaws together with force, is perform'd by the Contraction of the Temporal Muſcles, ſays *Veſalius*, which being united with a large ſemicircular carneous Origine from the hollow of the *Os Frontis*, ſinks into the Sphenoide and Temporal Bone, together with the Fibres running under the *Os Jugale*, which being ſtrengthen'd and determined by the Fibres taken from thence; they become all about tendinous, but as yet carneous, on every ſide of the *Coronoide* Proceſs of the lower Jaw; the *Maſſeters* which ſays *Veſalius* are carneous, and ariſe thick from the Firſt Bone of the lower Jaw, and the Jugal Bone, here croſſing their Fibres, they mutually inſert themſelves into the inferior, and exterior Margin or Edge of the lower Jaw, from the point or corner of the Chin, for near four Fingers breadth. The external *Pterygoides* which *Fallopius* and after him *Verheyen* remarks, that ariſe from the outward Part of the exterior Wing of the *Pterygoide* Proceſs, in the *Sphenoide* Bone, and the upper Part of the ſame *Sphenoide Bone*, running backwards are inſerted by a ſtrong Tendon, in the ſemilunar Space, ſituated in the internal Part of the lower Jaw, betwixt the *Condyloide* and *Coronoide* Proceſs: The internal *Pterygoides*, according to *Fallopius*, *Verheyen* and *Cowper* in his Appendix to *Bidloo*, which ariſing carneous and tendinous from the whole inward Superficies of the external Lamella of the *Pterygoide* Proceſs; progreſſively deſcending broad and ſtrong, have deep Impreſſions made in the Tendon, a little above the internal Angle or Point of the lower Jaw under the great *Apophyſes*: For if the eight Muſcles deſcrib'd act together, the lower Jaw muſt be ſqueez'd or preſs'd with incredible force againſt the upper, and the eight cutting Teeth, being thus ſtrongly compreſs'd makes the Action of biting.

Hence the Meat or Food thus divided, is thrown among the *Molares* or Grinders; whoſe Superficies are broad, that they may perform the Action of Attrition: The ſtraightning or holding of the Jaws ſtrict together, proceeds firſt from the Contraction of the *Buccinator* or Trumpeters Muſcle, which *Cowper* ſays, ariſing broad and carneous in its beginning from the Fore Part of the Coronoide Proceſs of the lower Jaw, ſticks with ſtrait Fibres in the Gums of each Jaw, which going forward thro' the Cheeks is inſerted in the Angle of the Lips. The *Orbicularis* of the Lips, ſays the ſame Author, which performs the opening of the Mouth and Lips with its carneous Fibres is inſerted into no Bone at all. The *Zygomatick* Muſcle which hath a carneous riſe from the external Part of the *Os Jugalis* deſcending obliquely is inſerted about the corner of the Lips, the common Elevator of the Lips which is inſerted from the fourth Bone of the upper Jaw to the meeting of the Lips, in its own Tendon under that of the former, the proper Elevator of the upper Lip, which from the ſame fourth Bone hath immediately its riſe upon the former obliquely deſcending, diſappears under the

Skin of the upper Lip: The proper *Depreſſors* of the under Lip ariſing from the lower Part of the Jaw next the Chin, are inſerted into the under Lip: The proper Elevator of the under Lip, which ſprings from the lower part of the Gum of the under Jaw, is inſerted into the lowermoſt Part of the Skin of the Chin: Laſtly, by the Help of the commnon *Depreſſor* of the Lips, which ariſes carneous from the lower Edge of the lower Jaw, about its ſides the aſcending is inſerted to the corner of the Mouth or Lips.

If all theſe act together, then the Cheeks and Lips are ſo clos'd to the Gums and Teeth, that neither Meat nor Drink can fall betwixt them; but if they move ſucceſſively, they are directed to different places: In the next place the ſame Conſtriction is made by the Tongue, the Muſcle chiefly voluble through all, and eaſily moveable to every Part of the Mouth is acted: Firſt, by the Muſcles call'd *Genioglоſſi*, ariſing from the internal Part of the Chin by a carneous Beginning, iſſuing out by Dilatations, and inſerted into the root of the Tongue, which draw the Tongue forward, and contract it back again, and as *Cowper* further ſhews, the *Ceratogloſſi* ariſing from a broad carneous Beginning on the ſide of the *Os Hyoidis*, from whence aſcending by a large Duct of Fibres, we ſee them diſpers'd thro' the Tongue, they move it back, depreſs and extend it: The *Stylogloſſi* which ariſing from an external Part of the *Styloide* Proceſs of the Temporal Bone, by an acute Beginning obliquely deſcending, inſert themſelves by the hind Part of the Tongue, which they raiſe, draw ſide ways and extend. Secondly, by the Muſcles forming the very Body of the Tongue which are according to *Malpighius* Longitudinal, they render the Tongue ſhorter, but tranſverſly they draw it narrower, perpendicularly they leſſen its Thickneſs: There are others that draw the Back and Sides of the Tongue, and ſome angular Muſcles that contract it inward, others that depreſs the Back Part ridge ways, or to a point, and ſtrait or right ones compreſſing the *Baſis* thereof: All which ſingly or conjunct eaſily explain the determinate Motion of the Tongue in the Action, it performs in the Mouth towards Direction of the Meat and Drink either to the Grinders or the Gullet; adding thereto the Action of the Fibres on the external Muſcles out of the Tongue, which move together with them. But it is plain that beſides the Motion of the Jaw, backwards, forwards and ſideways, that the Victuals are ground and broke to pieces, by the Muſcles of the Cheeks and Lips and the Tongue, without having regard to the Teeth plac'd in the *Mandables*, to which Motion over and above there are other Changes made by the Mixture of the *Saliva* and the *Mucus* of the Palate and Jaws, together with the Intromiſſion of Air.

The Origin, Nature and Mixture of the Saliva.

FIrſt according to the Notions of *Steno, Nuck,* and *Valſalva*, at the Root of the Ear in a ſmall hollow, betwixt the Mamillary Proceſs, the *Condyloide* and the *Os Jugale*, adheres a complex conglomerate gland making a *Sinus*, whence ſpreading it ſelf breadth ways, it reaches to the anterior, inferior and back Parts; this Secerns the *Saliva* by its Configuration or Make, from the Arterial Blood, and depoſites it into a common Duct, which perforating the *Buccinator*, about the third upper Grinder of the Teeth pours it into the Mouth. *Wharton* ſaith, that there is a large internal *Maxillary* gland ſeated betwixt the Jaws, poſſeſſing almoſt the whole Length thereof, which ſeparates the *Saliva* likewiſe from the ſame Arterial Source, throwing it into an excretory Duct that riſes on the back Part of it, and makes its way forward, almoſt to the fore-cutting Teeth, but in the middle way admits of two ſide Branches, from which ſpring two others that convey this *Saliva* to the Forepart of the Tongue.

There are glands ſays *Bartholine*, that appear under the Tongue, for that the Palate, Gums and Lips, are perforated by little Ducts or Sluces, thro' which an Humour or Flind much like the *Saliva*, but a great deal thinner flows. *Schneider* and *Nuck* both allow the glands of the Palate, eſpecially the hind Part as well as thoſe of the *Uvulæ* and *Tonſillæ* to ſeparate a *Mucus* that mixes it ſelf with the Aliment: But all theſe Fountains and Sluces are ſo ſeated, that they may emit their Liquors chiefly upon the Motion of Manducation or chewing. And *Nuck* makes it a Queſtion, whether in Man there be any other Salivatory Gland or Duct?

The *Saliva* is a diluted Humour or Fluid, which is pellucid, will not congeal or thicken by the Fire, and is almoſt void of Taſt and Smell; if ſhak'd it will hardly froth, it is a glandulous Liquor ſecreted from pure Arterial Blood; more copious fluid and ſharp by Abſtinence; but long faſting makes it very acrid, penetrating, deterging and reſolving Flowers, Meal, or ſucculent Vegetables encreaſes its Fermentation; it is thinner in Brutes, healthful Men and ſuch as ſleep much; too great a voluntary Secretion or Diſcharge of it, creates or procures an *Anorexia*, *Dyſpnæa*, and *Atrophia* or waſting: Water and Spirits makes it abound, but Salt and Oil decreaſes and makes it leſs in Quantity.

The Motion of *Maſtication* therefore by expreſſing the *Saliva*, and mixing it intimately with the Aliment, tends, firſt to promote the Nutrition of the Body. 2ly, To mix the oleous with the aqueous Parts. 3ly, For the Solution of the Saliva. 4ly, Fermentation. 5ly, An Alteration of Taſte and Smell. 6ly, Exciting the inteſtine Motion in the mean time by the Aſſiſtance of Air, Aliment, *Saliva*, and *Mucus*, well mix'd and incorporated together, by the weight of Fluidity, Elaſticity, Heat of Body, and variety of Preſſure at all times, there is Attenuation, Production of Fluxibility, and a Continuation of inteſtine Motion throughout the whole Maſs.

Thus being ſubdued and rendred tractable, attenuated, moiſten'd, and lubricated the Food or Meat, is protruded towards the Gullet, whilſt being bound there, by the Muſcles of the Cheeks and Lips together with the Motion of the Tongue, it is compreſs'd betwixt this and what *Bidloo* calls the fornicated Palate, and the foldings between the Cheeks and the Oeſophagus, while the *Genioglosſi*, the *Dorſi Longitudinales*, the *Stylogloſſi* and *Ceratogloſſi* by ſucceſſive Motion act upon the hollow Root of the Tongue under *Cowper*'s *Vail* of the *Palate*, the *Uvula* and *Almond glands* upon the *Larynx*, and *Pharynx*; and forming before the Membranes that cover them thoſe Bodies of the *Vertebræ* of the Neck, which aſſiſt Deglutition or ſwallowing.

Then from the Action of the *Genioglosſi*, the *Geniohyoideus* as *Caſſerius* mentions ariſing from the inward Part of the Chin, is fix'd about the Articulation of the ſmaller *Cornua* of the Cartilages of the *Os Hyoidis*; the *Mylohyoideus* which proceeds in a large Tendon from the middle Part of the *Baſis* of the *Os Hyoidis*; is tyed or fix'd again by a large *Aponeuroſis* to the lower Mandible, near the Grinders even to the Fore Parts poſſeſſing that Space which lies betwixt the *Os Hyoidis*, and the inſides of the lower Jaw. The *Styloceratohyoideus* which ſprings from an acute carneous Beginning of the Styliforme Proceſs of the Temporal Bone, obliquely deſcending forward, penetrated by the Digaſtrick is inſerted into the Articulation of the larger *Cornua* with the *Os Hyoidis*; the Root of the Tongue is extended and lifted up, which being apply'd to the Vail of the Palate, the *Foramen* of opening into the Noſtrils is ſhut thereby; likewiſe the *Os Hyoidis* and the *Larynx*, aſſiſted by the Contraction of the *Thyrohyoideus* of *Aquapendent*, which ariſing carneous from the ſide of the *Os Hyoidis*, in its deſcent it is tyed to the lower Part of the *Scutiforme* Cartilage, they are raiſed up, and by the Preſſure made in ſwallowing they ſhut the *Epiglottis*, and apply or clap the *Uvula* to the Chink of the *Glottis*; expreſſing from the Palate, *Tonſillæ*, *Uvula*, the Root of the Tongue, *Epiglottis* and Glands thereof, a ſlippery Mucus, they do not only come round in Deglutition, but they move forward, at the ſame time the Root of the Tongue, the *Os Hyoidis* and the *Larynx*; ſo that they open the *Pharynx* as *Valſalva* relates, relaxing the *Oeſophagus* according to *Cowper*, and ſo by that means perform the act of ſwallowing: But at the ſame time the internal and external *Gargareon* Muſcles as *Fallopius* and *Riolan* call them, elevate the Vail of the Palate, extend it every way governing the *Uvula*, ſo in ſwallowing they open the *Glottis* which being fallen, they occaſion an Eructation, or caſting up thro' the Noſtrils.

From hence relaxing all that were contracted, both the *Sternohyoidei* move, which from the internal Part of the *Clavicle* near the *Sternum*, aſcending with a broad carneous Beginning is inſerted forward into the *Baſis* of the *Os Hyoidis*; the *Coracocerato hyoideis*, which ariſing from a round carneous Beginning of the upper Part of the *Scapula*, to the Root of the *Coracoide* Proceſs in its Progreſs making two Bellies, is affix'd to the Forepart of the *Os Hyoidis*. So the *Pharynx* being ſhut at the ſame time conſtringes the *Oeſophagus*, ariſing on each ſide of the *Scutiforme* Cartilage, and running into each poſtick Line of the Gullet, by the force of ſwallowing they cloſe in the hollow of the *Oeſophagus*, under the *Pharynx*.

Which Tube ſaith *Verheyen*, conſiſting of divers Membranes, depending mutually on each other, which by the Aſſiſtance of the firſt *Mucus* conſtantly moiſtens the internal Cavity, rendring the *Saliva* more oily, whereby it affords a ſlippery Paſſage indeglutition, and gives a neceſſary Flexibility to its Fibres. In the next place, where it depends on the former glandulous Coat, there a Juice is expreſs'd by the canals into the hollow of the Tube, and here the Muſculous Bodies are encompaſs'd by the orbicular Fibres, which are bound in by the Longitudinal; and at laſt all the fine thinner Parts are involved in a fibrous and vaſculous Membrane. Therefore by the Contraction of the longitudinal and orbicular Fibres the lubricous Deglutition is made, by the fat way being dilated in ſwallowing, whence the Aliment is protruded thro' the relax'd open Paſſage into the very Mouth of the Stomach; and therefore where it deſcends, the upper Fleſh as *Bartholine* ſays of the lower Muſcle of the Diaphragm, binding or conſtringing the Gullet there, as it paſſes by, ſhuts the Stomach or *Ventricle* in this Part.

The Action of the Stomach upon the Aliment.

THE Meat and Drink being ſwallowed, ſhut up in the Stomach, entertain'd with Heat, and mix'd with the Air, according to the variety of matter, begins in this Place naturally to ferment or putrefie, either of which ways it is wonderfully changed, into a ſour, ſweet, or rancid Maſs.

The ragged Coat of the Stomach which receives the Aliment, is furniſh'd partly with a hairy, tubulous, rough, moiſt, glutinous Cavity, and partly convex ſupply'd with many different ſmall Glands, which ariſe from the vaſculous Coat that adheres to it, abounding with *Arteries*, *Veins* and *Nerves*: Therefore from its ſmall Sluices or Canals, it conſtantly emits a thin, ſubtle, pellucid, ſpumous Fluid, enrich'd with Spirits, moderately ſalt, and in the moſt voracious Animals, not Alcaline nor Acid, but in long faſting acrid, which is ſecreted out of the ſmall Ducts of the *Gaſtrick Arteries*, beſides a ſmooth *Mucus* Humour from the Glands, collected in little Bags, and expreſs'd thence into the Cavity or hollow of the Ventricle: Large Contractions of the Stomach makes great Foldings, which ſtops the Aliment, cauſing an acrid Ferment and aſſiſting the Attrition or breaking of the Food to a Pulp, exciting thereby Hunger: *Malpighius* and *Peyerius* inform us, that ſuch Animals as want this villous Coat and theſe Liquors, have a Crop or Craw, and *Sinus* or Receptacle before the *Ventricle*, which conſiſts of almoſt the like Texture and Humours.

If we conſider in what Plenty the *Saliva* continually flows upon this Part to the Food, both from the Mouth and Gullet, perpetually diluting what is upon the Stomach, agitating the various Parts, effectually giving Motion to them by the Admiſſion of Air, and exciting Heat in the Part; by which means we ſhall ſee the Effects perform'd of Maceration and Dilution, and the Aliment ſo attenuated and diſſolv'd that Fermentation is procur'd, and thus adapted to enter into the Paſſages and Humours of our Body: Yet we cannot from hence diſcern how the Solids, that are not yet chew'd and broken to pieces, become ſucceſsfully digeſted in the Stomach.

But that the Cauſe inquired after, may be found out, let us look into the Muſcular Fabrick of the Stomach, and conſider what Actions depend thereon: Then it will appear that the carneous Membrane of the Stomach, according to *Willis* is compos'd on the convex Part of ſtrong Fibres, which beginning at the upper Orifice proceed to the *Pylorus* in an orbicular or ſpiral Order, and ſurround its Cavity in a perpendicular Situation almoſt the whole Length thereof, and bind it length ways by its Contraction, but on the concave or hollow Part, it conſiſts of Fibres, firſt of all oblique, which contract the bottom of the Stomach, obliquely towards its back Part, and towards the upper Orifice, and ſo length ways leſſening the Contraction: In the next place, it hath ſtrong Fibres, ſpreading over the *Pylorus*, by a Parallel Courſe length ways, united on the back Part, running round the upper Orifice, and ſo they open the Mouth of the Stomach when empty, and ſhut the upper Orifice when full, cloſely conſtraining the lower.

It is likewiſe plain, that this Membrane is ſtill girt as *Willis* obſerves, with another extreme one, which on the Convex Part is very vaſculous, but on the Concave fibrous, with a Parallel Longitudinal Duct: which helps the Conſtriction or binding length ways; and therefore theſe Fibres are very ſpringy, but are not altogether ſtrong enough to diſcharge the Stomach, where they act together, they ſhut the Orifices, forcibly preſs or ſqueeze the diſtended Contents, mix and grind them with the vermicular Motion, attenuating the groſs Maſs contain'd in the Stomach, driving the more fluid Parts towards the *Sinus*, before the *Pylorus*, by which being contracted but leſs cloſed than the upper Orifice, the thinneſt Part which is reduced to a pulpy matter, firſt is by degrees leiſurely thruſt into the *Duodenum*.

By ſuch a Motion only ſays *Harvey*, but more violent many Animals uſe to macerate their Food: Our hearing ſaith *Borellus* is witneſs of this, ſo that Obſervation demonſtrates it effectually; but the Nervous and Muſcular Fabrick of this *Viſcera* informs us that there is the like in our ſelves.

Whether or no, or from what Cauſe can we underſtand, why little Meat and Drink received ſhall make the Stomach evacuate or diſcharge? Why the

Stomach too much loaded ſhou'd not do the ſame or digeſt, but vomit up crude that which hath lain there ſome time? What Reaſon can be given that tho' we greedily and at once pour down Liquors, the Stomach ſhall certainly retain them.

But theſe Things not yet appearing ſufficient to explain the Alteration of the Aliment made in the Stomach; we ought further to have regard to, or bring under our Conſideration. Firſt the perpetual nouriſhing Heat of the ambient Parts. 2dly, The innumerable Motions or Strokes of the Arteries that are in the Stomach, Diaphragm, Caul, Spleen, Liver, Pancreas, Meſentey and Peritonæum. 3dly, The forcible Vibrations of the *Aorta* it ſelf. 4ly, The Strength of the Nervous Liquor in no place more plentiful than here. 5thly, The continual Reciprocal and ſtrong Compreſſion of almoſt all the *Peritonæum*, by the great *Diaphragm* as *Bartholin* and *Veſalius* both call it, which aſcends from the right inferior Part of the Three Firſt *Vertebræ* of the Loins, on the left, from the laſt and laſt but one *Vertebræ* of the *Thorax*, ariſing from a tendinous and then a carneous Beginning with ſtreight Fibres on the upper Part, ſpringing from a thin membranous Beginning, it preſently grows carneous from all that ſide of the cartilaginous Top of the inferior Ribs and the loweſt Part of the *Sternum*, running downwards with a Hundred creeping Fibres; it becomes tendinous, and is intermix'd or confounded with the former: From whence acting as from a Convex, it is plane, and binds the *Abdomen* and its Contents; ſtrongly compreſſing Ten *Abdominal* Muſcles with one united Contraction, and governing the *Abdomen* by its reciprocal Motions and great Strength, as Contemplation informs us.

For firſt ſaith *Veſalius*, the oblique, exterior, tendinous and carneous Part, ariſes from the lower ſide of the Ribs, deſcending it grows tendinous, and is inſerted into the *linea alba*, the *Os Pubis*, the anterior and upper Side of the *Os Ilium*. 2dly, According to *Spigelius*, the oblique inferior carneous Part ariſes from the circular Courſe of the *Os Pubis*, growing tendinous, from the fore bending Fibres, and is inſerted into the *linea alba* and the Cartilages of the Ribs. *Fallopius* ſaith it is pyramidal and carneous from the anterior upper Part of the *Os Pubis*, grows tendinous to the *linea alba*, and is inſerted into the *Navel*; with *Veſalius*, it is tranſverſe from a carneous Riſe, of the tranſverſe Proceſſes of the *Vertebræ* of the Loins, and derives it ſelf from the Spine of the *Os Ilium*, the Ligament of the *Os Pubis*, and the cartilaginous End of the Ribs, beneath the *Sternum*, being inſerted with a broad Tendon to all the *linea alba* under the right Abdominal. Laſtly, *Spigelius* affirms the right carneous one comes from the *Xiphoide* Cartilage, the Cartilages of both lower true Ribs, the Cartilages of both the upper Baſtard Ribs, conſiſting of five tendinous and five carneous Parts, and at laſt is inſerted into the upper anterior Part of the *Os Pubis*.

But if we think the Force of all theſe Cauſes, conſpiring together in one united Work ſufficient to render the Maſs in one place ſoft and ſoluble enough, we may truly ſee the Effects which happen to this Part, the conſequences of which ought to be. Firſt, That Moveables be mix'd with Fluids, to levigate and reſolve into Fluidity to produce a cineritious or aſh Colour, to preſs by degrees, and ſqueez out what is contain'd therein. 2ly, That the more tenacious remains be kept or with-held from the firſt Operations, and that the ſame Cauſes continuing, they undergo the ſame Work, and ſhew the ſame *Phænomena* at firſt. 3ly, That Fibres, Membranes, Cartiſages, the Bones, and the hardeſt Parts of vegetable things be render'd juicy or liquid, and laſtly, that they be expell'd the Stomach, yet cohering in Form. 4ly, That by diſſolving Vegetable and Animal Food, a Humor be made Analogous to that of our own. 5ly, That there be made a ſpeedy Reſtoration to the Feeble from want of Strength; whilſt the ſubtle Fluid received by the Pipes or Canals, from the Mouth, Gullet and Stomach, opening and evacuating themſelves into the Lymphaticks, is from hence ſent by a ſhort Road into the ſanguineous Veins, and thence immediately by the aſſiſtance of the Arteries, diſtributed into all Parts of the Body.

Therefore whether the Heat alone be the Stomach's Cook? or it be the vital *Acor* or Sharpneſs that is in the Stomach, inſpiring Life, as natural to that Ventricle? Whether Digeſtion be deficient without Acid? What thick, ſalt, acid or bitter Humor, cauſes ſuch Ructations in the Breaſt of a healthful Man, and whence this ariſes? Whether it be a different or various Cauſe that excites Hunger, and what it is? Why the Stomach ſwells in Digeſtion; but is flaccid or lank when empty?

The Action of the Inteſtines or Guts upon the Aliment.

THat it may be rightly underſtood what happens to the Chyle of the Stomach, and the remaining Fæces in the Guts, we will conſider the Fabrick or Structure of this Duct, the Humors drawn from thence, the abſolving Veſſels, their Motion, and that of the circumjacent Parts. Firſt, The Coat or Covering of the ſmall Guts, which contains the Chyle, is rough, broad and perforated with aqueous and glutinous Pipes, with the Mouths of the Lacteals and large Apertures, which being diſtinct, afford a wat'ry, glutinous Humor, that conſtantly moiſtens and lubricates a muſculous one lying upon it, which is very rough, here eſpecially, where it is tyed to the *Meſentery* ; and convex with a vaſculous, glandulous and nervous Part ; from whence 'tis a Check to the Chyle and *Fæces*, a continual Interception of theſe, the Lubrication and Defence of the Cavity, daily Dilution of the groſſer *Fæces*, eſpecially about the end of the *Ileum*, where there is an Oilineſs of the ſolider Excrement.

Here is another thin Coat, according to *Willis*, except we will ſuppoſe it to be part of the ſame, conſiſting of a reticular Texture of an innumerable quantity of arterial, veinous and nervous Veſſels, which adhere almoſt to the Baſis of the *Peyerian* Glands, the tops of which opening to the Superficies, ſupply it with a Gelly or Mucus, theſe in the beginning of the ſmall Guts are few, but increaſe in Size and Number ; from whence proceeds Heat, Pulſation, Trituration, Dilution, Lubrication and a Defence.

A muſcular Coat ſurrounds this, with a concave Part, ſtrengthen'd with thick, firm, annular Fibres, inſerted into the Sides or Borders of the *Meſentery* as a *Tendon* ; from whence the whole Cavity of the ſmall Guts is bound ſucceſſively by Parts with riſing Valves that play backwards and forwards reciprocally ; the Contents are lodg'd in the rough Sides of the Inteſtine, where they are ground, mix'd, attenuated, and hindred from Concretion, the very ſides of the Guts, being rub'd off from the Convex Part length-ways the firſt ſtriking againſt them, with which folding in, they are contracted, and are ſtretch'd out-right, eſpecially in Places from the Region of *Meſentery* to which they are tyed.

The laſt external Coat of all that wraps in the former, is from the Peritonæum, and knit to the *Meſentery*. This whole long Duct, Pipe or Canal, is tyed ſhort to the Borders or Sides of the *Meſentery* ;

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it hangs downwards, and is gathered or folded wonderfully into a great many Turns or Windings, almoſt every way, being cloth'd and interſpers'd with Fat, beſide the Lubrication it receives from the gentle Exhalations or Dew of the Caul; it is relaxed and render'd moveable; is extended or ſtretch'd under the *Peritonæum*, with which, by the Motion of other ambient Cauſes, they perform reciprocal Actions together: In a healthful Condition, it only wants dilnting, the Fæces growing thick, or the nearer their Excluſion, in a ſound and lively State this Veſſel is wonderfully contracted; it is perpetually agitated by the Periſtaltick Motion, wherefore it becomes more apt for grinding, bruiſing, ſeparating, diſſolving, attenuating and volatilizing, from whence it propels the Chyle into the Mouths of the Lacteals, and theſe are common to the whole Tract or Circuit of this Veſſel.

In the *Duodenum* its Rectitude and Narrowneſs is proper to it, but it is laxer at its knitting to the Meſæraick, the Perforation at the end for the common Paſſage of the Bile and the Pancreatick Duct of *Wirſungius* otherwiſe joyned together, according to *Gliſſon* and *Graef*, are ſometimes ſeparated or divided; wherefore the celebrated Paſſage to the Chyle is made by theſe Mouths, by this way you may diſcover a triple Humour entring the Cavity of the Gut, to wit, the *Cyſtick* and *Hepatick Bile* as well as the *Lympha* from the *Pancreas*.

Of the Action of the Cyſtick and Hepatick Bile.

THE *Bile* of the Bladder is thicker, of a deeper yellow, bitterer, and which does not conſtantly flow into the Inteſtines, but is ſecern'd copiouſly by external Compreſſion, and the Contraction of the irritated Fibres. But the *Hepatick Bile* is thinner, more pellucid, ſofter, and flows drop by drop, being only expell'd by the Actions of the Ducts and Humors about it. Thirdly, The Pancreatick Juice is almoſt perpetually ſecerning; from which when it meets with the *Saliva* and *Mucus* of the Mouth, Gullet, Stomach and Guts, it makes a ſpumous or frothy Liquor, and ſometimes a little clammy, which is often ſqueez'd up into the Stomach when empty.

But the *Cyſtick Bile* reſiſts, ſharps and ſours, and is furniſh'd with another Faculty peculiar to it ſelf; it is ſaponaceous, abſterges and makes Oils mix with Water; it diſſolves R*oſins* and the moſt tenacious Gums, and makes them homogeneous, is neither Alcalick nor Acid, but coagulates Oil, Salt and Spirits diluted with Water; will not burn, except it be firſt dry'd, and is the moſt biting or ſharpeſt of all the Humors of the Body; wherefore its Effects are when mix'd with the *Chyle* and *Fæces* to attenuate, abſterge and ſtimulate the moving Fibres, to intermix thoſe Fluids which are of different kinds, to break the acrid ſaline Parts, and divide the coagulated or thick ones, to expedite the way for the *Chyle*, excite or provoke the Appetite to ſerve inſtead of a ferment, and to aſſimulate the crude to the Parts digeſted, in theſe the *Cyſtick Bile* much exceeds the Hepatick, the Deſcription of which I ſhall refer to the *Liver*.

Of the Action of the Pancreatick Lympha.

UNder the hind Part, and the bottom of the Stomach, in the firſt Place there hangs in the poſterior Lamella of the *Caul*, a large conglomerate Gland, call'd by *Wharton*, *Graef* and *Veſalius*, the *Pancreas*, which by the Aſſiſtance of the Cæliack Arteries and the Texture of the Gland ſecerns a Humor or Fluid into one common Duct, which makes its Exit into the *Duodenum*, and from thence brings all that *Lympha*; but it is almoſt inſipid, in Taſte ſomewhat ſalt, limpid, plentiful, always making and emitting, neither *acid* nor *alcaline*, but analogous to the *Saliva*, confuſedly mix'd with the *Bile* in living Bodies, being digeſted therewith, and adhering in the ſame *Pipe* or *Tube* with it, is not obſerv'd to give any Aſſiſtance to the Motion of the Gut, but is equally diſtributed thro' it, and ſometimes flows alone into the Empty Inteſtines, hence the Uſe of it is to mix with the Chyle, Fæces, Gall and Mucus, in order to dilute their groſſer Parts and render them more fluid and thin, that they may better mix together, to render the *Chyle* more miſcible in the Blood, and to adapt it for a readier Paſſage thro' the *Lacteals*, to ſoften its Auſtereneſs, Viſcidity and Bitterneſs, to change its Colour, and intermix it perfectly with the *Chyle*, to make it capable of performing the Office of a *Menſtruum* and *Vehicle*, ſo to change the ſingular Taſte and Smell of Food, that it becomes as it were almoſt indolent, and that the *Chyle* may be able to go and return this way with Eaſe and Expedition.

Wherefore being ſtrongly queſtion'd wilt thou anſwer, whether the *Bile* be double? Whether an Excrement of the *Hepatick Chyle*, while the Blood is there return'd back? or whether it produces any Advantage to Health and Life? but what is that? in ſhort whether the *Paucreas* and *Bile* anſwer the Syſtem of *Helmont* and *Sylvius*? or whether they become a *Duumvirate* here and what? whether they can excite and ſuſtain Life from the Inteſtine Motion of the Blood? what the *Pancreatick* Juice is, and to what end? why does it flow with the *Bile*, or at leaſt next it? whether the Animal can live well without it?

The Propulſion of the Chyle into the Lacteals.

BY the Contraction of the ſtrait Fibres of the Inteſtines, which are inſerted to their external Coat as a Tendon, the Veſſel or Pipe is made rough in the Part which is turn'd back from the *Meſentery*, hence from the ſpiral Tube it acquires a Cylindrick Figure, by which means in the Part joyn'd to the *Meſentery* it is lax, in the Part againſt the *Meſentery* it is conſtring'd; wherefore the Paſſages or Pores next the *Meſentery*, that is, the Mouths of the Lacteals, are found lax and open to the Fluid, moveable and lubricated Chyle, by which it may readily enter; in the mean time the Valves being ſtrengthen'd by the ſame Force erect, mutually approach each other, intercept the *Chyle*, ſtop it, and almoſt cloſe the contracted Part of the Inteſtine.

Alſo by the orbicular contracted Fibres, inſerted into the *Meſentery* as a Tendon, the *Cylindrick* Spaces are contracted, and ſhut up by the Valves mutually preſſing to each other, wherefore the *Chyle* by means of this Force, and the Action of the ambient Bodies, is ſqueez'd out, diluted, mix'd and driven towards the proper Places in the *Meſentery*, that is, it is forced into the Mouths of the Lacteals, which are beſt open'd by the Periſtaltick Motion: Yet the fermenting *Chyle* enters not the Lacteals by its own Energy. That *Chyle* therefore that enters the Mouths of the Lacteals, is falſly ſuppos'd to be only the Production of Meat and Drink, for it is a Fluid or Humour conſiſting chiefly of *Saliva*, the thin Mucus of the Mouth, that double Liquor of the Gullet and Stomach, of the *Cyſtick* and *Hepatick Bile* the *Pancreatick Lympha*, of *Peyerius* inteſtinal Humor, and as *Brunnerus* of the *Paucreas* ſays, of that ſtrong, copious and ſubtle Liquor, ſupply'd from an innumerable quantity of Nerves; for all theſe Humors, whether paſſing thro', flowing out, or mix'd with the *Chyle*, are always entring the Lacteals, tho' they are only conſpicuous or viſible a little after eating.

Whether or no the thin, bilious and lymphatick Part of that *Chyle* is not more received into the abſorbing Veſſels, that open upon the inward Superficies of the Guts, and empty or diſcharge themſelves into the Meſeraick Veins, from whence there is a Dilution made in the *Vena Porta*, and new Matter for the *Bile* to ſecern? Certainly the Number of theſe, their Largeneſs, and ſingular Texture or Make about the Inteſtines, their common Nature with all Veins, the Humor flowing hence, as well into the *Vena Porta* as the *Artery*: The Diſpoſition of this Fluid; the great quantity of Humors meeting in the Inteſtines, which are not all received by the *Lacteals*, neither are they obſerv'd to be expell'd by Siege. Comparative Anatomy not finding Lacteals in *Oviparous* Animals, and yet diſcovering a Paſſage in the *Meſeraicks* from the Cavity of the Inteſtines, this Enquiry is anſwer'd.

Since all the *Phænomena* ſeem to depend on Meat and Drink, from the firſt Reception of them, to their Entrance into the *Lacteals*, their Conſequences ſeem clearly, naturally, and diſtinctly demonſtrable from the Structure, Fabrick and Strength of the Veſſels, the natural Knowledge of the Humors, and their virtual Operation demonſtrable to Senſe or reaſonable Mechanicks; whether theſe ought to be call'd *Poſtulata*, that are obſcure, doubtful and diſſonant to Reaſon and Experiments? Heat is call'd the Cook of the Stomach, its native Life, and what renders the Sourneſs thereof volatile. The *Archæus*, the Smith, the Alcaline Bile, fermenting changes the fix'd acid Chyle into a volatile ſalt one, the Sharpneſs of the *Pancreatick Lympha*, and the Efferveſcence with the *Alcaline Bile*, the Precipitation that depurates or fines down the *Chyle*: Peripatetick,

tick, Galenick, and Chymick Faculties; with a thouſand other pernicious *Hypotheſes* and falſe Notions that give Laws and Rules to Phyſick.

The Matter and Expulſion of the Inteſtinal Fæces.

THE groſſer part of the Aliment received, ſticking obſtinately in the Mouths or Orifices of the *Lacteals*, is looſed as it were by the Force of *Manducation*, the liquid Part being abſorb'd, by the continual Gyration or Motion of the ſmall Guts and the Structure of the Valves therein, driving the Solid by degrees into narrower and ſtraiter Places, the lubricated Fat of the Glands giving way, it becomes preſs'd, ſqueez'd, macerated, and drawn dry from any more Juice, 'til at laſt it is ſucceſſively thruſt forward into the wide Gut, call'd *Cæcum.*

The *Diverticulum* or Turning aſide of the *Cæcum* as *Veſalius* will have it, the vermicular Inteſtine, the Valve of *Tulpius*, from hence make a perpendicular Aſcent in the firſt *Colon*, that it cannot return into the *Ileum*, but ſtagnating here, the *Fæces* being ſtrongly preſs'd from their own Weight, the Action of the Gut and the external Parts about it; they are deprived of all Moiſture which is abſorb'd into the Lymphaticks: Hence they diſcharge or empty their Humors into the *alveum lacteum*, then the *Fæces* grow hard and dry, and putrifying at laſt, gain a fœtid Stench, and become Excrement or Dung: Then the *Valves* which are here ſo common, ſays *Bartholin*, and made of muſcular contracting Ligaments, by their bending or winding in, ſhew where the Stoppage is made, that the *Fæces* are retain'd ſo long; from hence the ſtrong, membranous muſcular Fibres, by the Strength of their Contraction, make the *Fæces* hard and immoveable, ſo that they would not be eaſily driven thro' the long Canal of the Guts, but as they are lubricated by the Fat of the Glands, as *Peyerius* aſſerts, and thereby ſent into the *Inteſtinum Rectum.*

The almoſt perpendicular Deſcent of which, ſays *Veſalius*, the internal Superficies whereof being ſmooth or lubricated without Valves or any Muſcular Ligament, makes that being driven thus far, the *Fæces* readily deſcend by their weight or acrimony, or both, irritating the ſtrong Muſcular Fibres, compreſſing the Gut, till the *Fæces* ſtick at the *Sphincter.* Then relaxing the large, groſs, carneous, orbicular *Sphincter* as *Bidloo* calls it, that ſurrounds the end of the *Inteſtinum rectum*, the *Levators* of the *Anus* are contracted, which from the internal Part of the Bones of the *Pubis*, *Iſchium* and *Sacrum*, which ſtriking the End of the *Rectum* with their winding Fibres, they dilate and raiſe it up. Hence by inſpiring, Retenſion, Rarefaction, Compreſſion of the Breaſt, the Aſſiſtance of Air, and then of the Diaphragm and *abdominal Muſcles*, the *Fæces* are expelled, while the *Sphincter* is only contracted.

From whence it appears what the matter of the *Fæces* is: Whether it conſiſts of the Recrement of the *Bile*, *Blood*, *Mucus*, *Saliva* or *Lympha* : What its particular Cauſe is: Whether from an excrementitious Ferment: Why the Inteſtines from thence have more Glands and more Mucus proper to their purpoſe: What Uſe Fat is of to the Guts, chiefly at the end: Why ſtrong People are coſtive, have hard Stools and few of them: Why the *Hemorrhoides* are ſo common to ſuch: Why in Exoneration, Urine is diſcharg'd together with Siege: Why the *Teneſmus* attend ſuch as labour under the Stone in the Bladder? Why the *Strangury*, in the *Bloody Flux*, and why the *Teneſmus* in the *Strangury.*

The Action of the Meſentery *upon the* Chyle.

THat *Chyle* which is impell'd by the *Periſtaltick* Motion the Mouths of the *Lacteals* being open, is propell'd the ſame way, and by the ſame aſſiſtance; but when the *Lacteals* are open'd into the Cavity of the Inteſtines by an oblique way, as many affirm, and the Mouths are ſmall, the fluider Part only, ſeparated from the groſſer and more ramous, will enter. Whence we may conceive, why Men are not hurt with that variety of acrid, hard and ſharp things which they eat, but remain healthful notwithſtanding; let us compare the Structure of the *Oeſophagus*, the Stomach and Guts, and we ſhall ſee they differ widely from the Structure of the reſt of the *Viſcera*.

The Cauſes which derive the *Chyle* into the Lacteals remaining, they are impell'd again a-freſh, and ſo promote the former, that it may flow by the Veſſels ſituated betwixt the Duplicature of the Meſeraicks, it is coerced by the ſemilunar Valves of *Nuck*, and the Flux carried towards the Loins. The *Lacteals* ariſe from the ſmalleſt Beginnings in the human *Meſentery*, moſt of the leſſer concurring at acute Angles, create a larger Stream, then again recede mutually from each other, and after that making an Iſland unite in one Canal, which is divided as the reſt, that hence they may form larger Trunks, which are every where ſupply'd with many Valves; hence the Mixture, Fluidity and Attenuation is increas'd: So far they are call'd *Lacteals* of the firſt kind.

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The Action of the Meſeraick Glands.

HEnce in a right, oblique, croſs or divided way, they tend to *Nucks Glandulæ vagæ*, interſpers'd thro' the *Meſentery*, running from whence, they enter, clothe, and ſurround or bind them in, but going out again, they are leſs branch'd, being turgid with the more fluid and aqueous *Chyle*, and diſtinguiſh'd by many Valves, and then they run to the *Ciſtern* ſeated on the Loins, and theſe obtain the Name of *Lacteals* of the ſecond kind. From this it is evident, that the *Chyle* cannot be any ways ſecern'd, at theſe Glands, but ſeems to be there temper'd or allayed; which is the more apparent, if we ſuppoſe with *Nuck*, that theſe cavernous Glands are water'd from many *Arteries* and *Nerves*, and that they admit the *Lympha* of the ſeveral *Viſcera* in the *Abdomen*, which entring there, dilute the Humors the more: Therefore being ſtopt upon that part, there is made a Conquaſſation, Dilution, and perhaps a Mixture of the Spirits from the *Nerves*; from whence the *Lacteal Veſſels* being more united, tend to *Nucks* Ciſtern of the *Chyle*, often to that, call'd by *Cowper* Trilocular, and hereby the moſt copious *Lympha*, ſaith *Nuck*, evacuates it ſelf of almoſt all the Parts, ſeated under the *Diaphragm*, from whence being brought by the Lymphaticks, it is thrown into this common Channel: For the Valves, Ligatures and Lymphatick Diſeaſes inſtruct us, that there is ſuch a Courſe or Circuit of this Fluid, which abounding with water Spirits and ſubtle Salt, is the moſt pure Part of the Blood, as its Office, excretory Ducts, and ſenſible Functions demonſtrate.

The Action of the Chyliferous Duct upon the Chyle.

THE *Chyle* being thus diluted by the Ciſterns plac'd under the *Diaphragm*, from the Cauſes already deſcrib'd, chiefly by the Force of the *Septum Medium*, and the Pulſe of the deſcending Trunk of the *Aorta*, it is thrown into *Pequet's Thoracick* Duct, furniſh'd on all ſides with Valves, from hence into the left *Subclavian* juſt thereabouts, where the *Jugular* opens into it, bound or directed by the help and aſſiſtance of the *ſemilunar Valve* of *Lower*, ſcarcely admitting the *Chyle* into the Vein, but none at all into the *Thoracick Duct*; the whole *Lympha* flows together almoſt from every part of the *Thorax*, whence it comes that that great plenty of *Chyle* and *Lympha* aſcends ſo eaſily in Man who is erect, by ſo ſmall or ſlender a Pipe, that is convey'd with Winding or Turnings, which will more plainly appear if we conſider. Firſt, The contractile Spring or Strength of the *Inteſtines*, and the aſſiſting Force that drives the *Chyle* from them. 2ly, The Aptneſs of the Lacteal Valves, the Ciſtern and *Pequet's Duct*, that expedites the Motion with wonderful Efficacy. 3ly, The Pulſe of the *Meſeraick Arteries* which ſtrike the Lacteals in Parallels. 4ly, the great Strength of the *Diaphragm* upon the Channel. 5ly, the Preſſure of the *Peritonæum*, which from powerful Cauſes acts upon the thin Meſeraick Membrane. 6ly, The proper contractile Form of the Sides of the Veſſels, that compoſe *Pequet's Duct*, which is very ſtrong even after Death. 7ly, The ſtrong Pulſations of the *Aorta* it ſelf, ſo near to the *Thoracick Duct*.

We muſt therefore obſerve thoſe things which happen to the *Chyle* in the middle way betwixt the *Inteſtines* and the Veins; which we ſhall divide into Four. Firſt, The ſlow Motion by the *Inteſtines*, *La-*

cteals and *Glands*, which the Laxneſs and Length of the firſt, the Number and Smallneſs of the latter evince: The End of all theſe is refining or purifying the Fluids. 2ly, The external Motion impreſs'd upon the Fluid from the Veſſels, the Effect of which is Propulſion, Mixtion, Attenuation and Conſervation of the Fluid. Hence we are taught to contemplate the Poſition of the Lacteal Veſſels, encreaſing by degrees, and ſupply'd every where with Valves, mutually agreeing with each other, that is going backwards and forwards, and at laſt uniting: In the next place, the ſtrong Action of the *Septum*, on the Abdominal Muſcles, and the Compreſſion of the *Viſcera* into the Lacteal Tubes, cleaving almoſt to the *Superficies* of the *Meſentery*, and lying as it were naked or expos'd; ſupplying a proper Heat in degree and moiſture; the effects of which are known and obſerv'd by the Chymiſts: Laſtly, The Pulſation of the *Meſenterick* Arteries, and the *Aorta*, being ſtrongly united on all ſides to the Canals, ſo that by their own motion they agitate them.

Thirdly, To make an Allay or Temperament, by the Mixture of almoſt all the *Lympha* of the Body, the Reception of a Chyliferous humid Vapour, that is in the firſt place ſuck'd in to theſe Lymphatick Veſſels; and perhaps by the Admiſſion of Spirits every-where to the conglobate Glands of the *Lympha* thro' the Nerves, and with that thrown into the *Chyle*.

Fourthly, To its Analogy with all the Parts of the Body, before it enters into the Blood Veſſels; whilſt it paſſes from the Mouth to the *Subclavian*, there is perpetually, gently, ſucceſſively, and by degrees added ſomething of almoſt every Humor of the Body that is elaborated, digeſted, frequently carried round and tranſacted throughout all the Veſſels, as the *Saliva*, *Mucus*, *Lympha* and the *Mucus* of Gullet, Stomach and Inteſtines, the *Pancreatick Saliva*,

liva, the Cyſtick and Hepatick Bile, and perhaps that of the Spirits from ſome of the minuteſt Parts of the Body; then at laſt this is accurately mix'd by the Strength of the whole Fabrick, the Figure, Situation and Motion of the Veſſels.

Whoſoever weighs theſe things will find the Principles of which the Blood is compoſed, to be lodg'd in the *Chyle*, while he may perceive Water, Spirit, Oil and Salts mix'd together; neither let any one wonder at the reaſon why Diſeaſes are ſo rare in the *Meſentery*, tho' that be ſeated ſo near to the Crude or undigeſted Fluid? For he may obſerve on all ſides Proviſion ſolicitouſly beſtow'd: The Lacteals and the Thoracick Duct are equally aſſiſted for conveying the *Lympha* by the Spirits, as well as they ſerve for the Motion of the *Chyle*; but he that would know the Circuit and Change or Alteration of the *Chyle* caſt into the Veins, and how it is mix'd with the Blood, muſt neceſſarily enquire into, and find out the progreſſive Motion and Efficacy of that Fluid, which we ſhall purſue in this following Method.

Of the Fabrick or Structure of the Veins and Arteries.

THE red Humor found almoſt every where throughout a living Body, and call'd Blood, is lodg'd in a ſound Man in proper Veſſels, which are either Veins, Arteries or other intermediate Receptacles. *Arteries* appear to be Canals, of a Conoide or Pine-apple-like, oblique, crooked, or branching Figure; internally they are ſmooth and without Valves, except in the Heart, their Branches have various Originals, but often they proceed from acute Angles towards the top, but rarely from right ones, as in the *Intercoſtals*, &c. ſeldomer from obtuſe Angles as in the umbilical Arteries of the *Fœtus*. They are made up of five *Tunicks* or *Coats*, the uppermoſt of which according to *Willis* is thin and nervous in the outward Superficies; in the inward very denſe, being interwov'n with a Network Texture of Arterial Veſſels from the Coronary Arteries and others, together with veins; the Second Coat, ſaith *Ruyſch* is cellulous, thin, but very dilatable, from the blowing up of the Cells; the third is glandulous, the fourth Muſcular, being made with annular thin Fibres, ſtrongly knit together, with a great Number of Strata, that are diviſible into many *Lamellæ* and very Elaſtick. Laſtly, The fifth Coat, which is the innermoſt, is thin and membranous, the Fibres being ſtretch'd length-ways, this intire Veſſel continues to beat and leap while Life remains.

The *Veins* are in Figure and Diſtribution almoſt like the *Arteries*; but they are wider, and abundantly more in number, they are much thinner and unactive in all their Membranes; they have *Valves*, which are almoſt ſingle at the Places of inſerting their Branches into the great Trunk, and double chiefly ſays *Aquapendent*, as they join into the right Trunks of the larger Veins, that are remoter from the Heart, and which carry the Blood perpendicularly upwards; which being made ſo, ſaith *Cowper*, and apply'd to the Cavities of the Canals, that they admit the Blood from the leſſer Branch to the greater, prevent its return, and ſuſtain the weight; but theſe very Veſſels in the greateſt Actions of Life neither leap nor beat.

All the *Arteries* contain'd in the whole Body, are united to the Trunk of the *Aorta* in its Paſſage, while that Trunk takes its Riſe from the left *Ventricle* of the Heart, but thoſe which ſerve for the uſe of the Lungs, are in like manner ſtretch'd out from the Pulmonary Artery to the Right *Ventricle* of the *Heart*, as the Form thereof ſhews when they are diſtended by an Injection of Wax.

The Veins how numerous ſoever, by the ſame Parity of Reaſon terminate in the *Vena Cava*, where that Veſſel grows larger, and becomes cover'd with an Arterial Membrane forming a large *Sinus*, after which it preſently ends in the Right *Auricle* of the Heart: But the ſaid Vein, by the form or make of the Lungs, from the four greater Branches diſtributed therein, makes ſuch a *Sinus* as the former, which is ſtretch'd forth into the left *Ear*; but there is ſome Diverſity in the *Liver*, that is to be explain'd when we come to ſpeak of that Part. Both theſe Veſſels are largeſt in the Heart, from whence they decreaſe by degrees, and attending one another almoſt every where, they are extended together thro' all Parts of the Body.

Of the Circulation of the Blood.

THE Blood of a living Animal ſufficient for Life, is almoſt totally driven out of any of the *Arteries*, open'd or divided by a large Wound, and that in a ſhort time, and with great force, as the Butchers teach us; neither is it material, in what Artery the Wound is made, if we give credit to the Diſſection of Dogs. Wherefore in a live Animal thus wounded, all the Blood is mov'd ſwiftly and with violence, eſpecially if the other Arteries that are not wounded be tyed, while the Blood leaps out of the wounded Part.

From whence it is plain, there is a Paſſage for the Blood from every Part of the Body that abounds therewith, into every Artery; and then the whole Maſs of Blood is mov'd, through that one Veſſel or Canal, and conſequently it ought firſt of all to be mov'd thro' the Veſſels, before the Wound was given.

Again, whatſoever Part of the *Arteries* you ſhall ſee bound about with a Fillet, that will tumifie and vibrate betwixt the Bandage and the Heart; likewiſe the neighbouring or adjacent Arteries that are free, beat vehemently; and if it be cut betwixt the Heart and the Bandage, it throws out the Blood quickly by Spouts or Streams, even till ſudden Death ſucceed: But where it is cut betwixt the Bandage and the extream Parts, a little Blood only falls out by Drops: Yet we ought to take care, that it be a ſingle Artery, not joyn'd intermediately by ſome large *Anaſtomoſes* of a neighbouring Artery in the Place above the Ligature.

Therefore the Vital Blood flows by the Arteries, but it is from the Flux paſſing out of the Heart to the extream Parts, from a broader Veſſel into a ſtraiter or narrower Part, from the Trunk into the Branches; therefore by this Rule or Law of Motion, all the Blood may be convey'd into every Artery or any ſingle one, and from that ſpread abroad or thrown out, and not the contrary way. Alſo take a large Vein and bind it with a Fillet, and it will ſwell betwixt the Extremities and the Bandage, but not pulſe or beat: It is empty betwixt the Heart and the Fillet, and by wounding it below, the Blood will flow out, till Death or a fainting of the Spirits enſues; but if you ſtrike above the Ligature, ſcarce any Blood will iſſue thence, nor matters it which *Vein* it is, as Blood letting ſhows.

Wherefore the vital Humour flows indeed ſwiftly from every Part of the Body into this *Vein*; but obſerve, after that manner, that the Road or Courſe is evident by this, from the extreme or remote Parts of the Body to the Heart, from the narrowneſs of the *Vein* towards its Enlargement, from the Branches into the Trunk, and not otherwiſe as the Valves inſtruct us. Hence it plainly appears, that all the Arteries of the Body conſtantly carry the Vital Blood ſwiftly round from the left Auricle of the Heart, thro' the Trunks of the Arteries into the Branches; from theſe, to all the Parts of the Body, internal and external.

But on the contrary, all the Veins of the Body, except thoſe call'd the *Portæ* in the *Liver*, from their ſmaller or minuter Branches, conſtantly carry back the Blood into the Branches of the Veins, from theſe into the Trunks, from thence into the *Venal Sinus*, and at laſt into the right Auricle; for from the *Venal Sinus* the collected Blood may be driven by the round wov'n Muſcle, into the reflected right Auricle, if nothing oppoſe, but it receives Aſſiſtance from the Motion of the venous Blood preſs'd thus far.

But ſince the right *Auricle* as well as the left, according to *Lower*, is a large hollow Muſcle, compos'd of a double Series of firm ſtrong Fibres, running with a contrary Courſe into the oppoſite Tendons of the Sides, and endowed as *Ruyſch* ſaith, with innumerable Veins and Arteries, ſupported on one Part, from the venous Tendon of the right Side of the Heart, growing on the other Part harder, being almoſt form'd round, or into a Circle by the *Vena Cava*: It is plain the Blood by this contractile Strength expreſs'd with great force, may be thrown inwards to the right relaxed *Ventricle* of the Heart.

For then the Heart emptying from a longer Return drawing back towards the Sides and towards the Point, with three *Tricuſpid Valves* as *Vieuſſens* calls them, by the oblong fine carneous *Papillæ* or Teats, ariſing from the Sides of the Right *Ventricle* of the Heart at that time drawn back, yet gives ſufficient way, that the Courſe of the Blood may not be altogether obſtructed. The Fabrick of the Part, the *Phænomena* on live Diſſections, Wind, Injections, *&c.* confirm the ſame.

But if the Right Cavity thus fill'd with Blood, by the Contraction of its Fibres preſſes the Blood towards the Mouth, here riſing near the Sides; it elevates the *Tricuſpid Valves* ſo tyed to the fleſhy Columns, ſtretch'd out from the oppoſite Side, that being entirely fallen or flagg'd, they can never be apply'd to the Sides of the Right *Ventricle* of the Heart, but thruſts theſe towards the Right *Auricle* ſo long, till being joyn'd there, they nicely ſhut the Mouth perfectly hindring any Return; becauſe thoſe very Columns are ſcarcely permitted to be pull'd farther backwards.

By the ſame Aſſiſtance, the ſame Blood is forced from the inferior Parts upwards, into *Vieuſſens* three *Semilunar Valves*, ſeated in the Courſe of the other Paſſage lying open into the *Pulmonary Artery*, it preſſes theſe on the Sides of the *Artery* opening away, into that alone. But the Figure, Subſtance, and Connexion of the ſame *Valves*, demonſtrate that theſe are thus forced from the Preſſure of the Blood behind, out of the *Pulmonary Artery* to the Right *Ventricle*, that being joyn'd together they nicely intercept the Courſe, and more exactly ſuſtain the Blood, by how much greater Strength it is puſh'd on: The Texture of the Part, the *Phænomena* in opening of live Bodies, *Arteriotomy* and Injection confirm it.

Therefore the venous Blood, that is, all the Blood of the Body is moved out of the *Venal Sinus* through the *Auricle*, and through the Right *Ventricle*, conſtantly, quickly, and violently into the Pulmonary *Artery* only. Out of the left *Venal Sinus* of *Ruyſch* from the four great Veſſels running together, all the Pulmonick Blood may be taken and paſs'd through, by the Muſculous Strength of its Texture into the left laxated *Auricle*, much leſs than the Right yet made and ſeated like the former: So from hence it may be eaſily propell'd into the left *Ventricle* for the ſame reaſon, becauſe of the like Condition of two *Mitral Valves*, as *Veſalius Lower* and *Vieuſſens* call them; but cannot return the ſame way.

And by reaſon of the three *Semilunar Valves* ſeated in the Entrance into the *Aorta*, this Courſe is directed right into the *Aorta* from the ſame Cauſes, eſpecially if that reſts, and exactly ſhuts up the way to the Blood forcing back again: But we ſpeak this of an adult Man, and the uſual Courſe of conveying the Spirits to Mortals.

Therefore all the Pulmonick Blood is mov'd from the Lungs into the left *venal Sinus*, the left *Auricle* and *Ventricle*, from hence it is conſtantly, ſuddenly, and violently thrown into the *Aorta*; which Motion evidentlyappears to be done in living Creatures with theſe *Phænomena*.

Firſt, That both the *Venal Sinus*'s being fill'd together, ſwell. 2dly, That both the *Auricles* flag together. 3dly, They are then fill'd in the very moment with Blood acted or driven on, by the contractile force of the *Muſculous Sinus* next that of the *Venous*. 4ly, In that very nick of time, both *Ventricles* contract themſelves, they evacuate the Blood, the two great *Arteries* are fill'd and diluted. 5ly, The Moment after this Conſtriction each *Ventricle* flags and is empty, then is elongated, and augmented in Size. 6ly, During which each *Auricle* contracts it ſelf by the Muſcular Motion, expreſſes the Blood contain'd therein, and propells it into the Cavities of the Heart. 7ly, In the mean time the *Venal Sinuſſes* are fill'd again as in the firſt *Phænomenon*, and all return with the ſame *Series* of Order, and ſo remain till the Animal languiſhes, and is at the point of Death. 8ly, When the *Auricles* beat often as well as the *Venal Sinus*'s, then the *Ventricles* are contracted after the ſame manner.

Therefore the whole Maſs of Blood returning from every internal as well external Part of the Body, and from the Heart it ſelf, and its *Auricles* is driven into the right Cavity, from thence it is work'd by the Lungs into the left, and hence thro' the whole Habit or Circuit of the Body, and then back again to the Heart; this is the Reaſon of the Blood's running round, or its Circulation, the glory of which Invention makes the Name of *Harvey* Immortal; and this is confirm'd by Infuſion, Transfuſion, and Microſcopical Obſervation.

In like manner the *Chyle*, tho' in ſmall Quantity being conſtantly preſs'd thro' the Thoracick Duct, raiſes the *Valve* of the *Subclavian* Vein, always ſhut by the determinate Motion of the Blood ſo far, that that Portion of the *Chyle* which in its Aſcent might leſſen the Reſiſtance of the Bloods Preſſure, enters into that Vein, and thence paſſes into the V*ena Cava*, the V*enous Sinus*, the right *Auricle*, and laſt of all into the firſt V*entricle* of the Heart.

This continual but ſmall Admiſſion, this concourſe or meeting of the Blood from oppoſite Strokes as V*erheyen* ſays, by a contrary ſwift Motion, perform'd in this one Place, the *Lympha* returning with larger Recruits, makes it that the Mixture of *Blood* and *Chyle* is begun here, that all Concretion may be hindred or prevented.

Which being done, the *Pulſe* according to the Texture of the *Auricle*, and immediately from the ſtrong Contraction thereof, together with the oppoſite Concuſſions or Strokes of all the Columns on every ſide, is manag'd and divided, the Fluid preſerved, it affects the *Auricle* with greater force, perhaps on the other ſide, as V*erheyen* takes notice, by the Bloods glancing thro', all which are aſſiſted and encreas'd by the Blood flowing into V*ieuſſens* new invented hollow of the *Auricle*, returning from the Subſtance of the *Heart* and the *Auricle*, which without

out doubt is the moſt agile or moveable, and is projected or thrown out with vaſt force in the *Auricles.*

But what is done to the *Blood* and *Chyle* thus poured into the Heart, is beſt known from the Property of the Blood and the Texture of the Heart; the way of diſcovering of which is to be taken from the variety of the Parts examined by ſolid Experiments, ſuch as we ſhall here recite.

The *Blood* that is in the Right V*entricle* of a live empty Animal, doth neither taſte *Alcali* nor *Acid*, but Salt like *Sal Armoniac* or *Sea Salt.*

If it is mixed with *Acids* or *Alcalies*, it ſhews no evident Motions of Efferveſcence, but changes Colours and Degrees of Fluidity.

Leaping out of the *Pulmonary Artery* cut, and received in a Veſſel, it gives us no Sign of an inteſtine Ebullition or Efferveſcence, but yields a ſtinking, ungrateful, acrid Fume, cooling it grows thick, and then one Part coagulates into a ſolid Maſs, and the other becomes more fluid than before.

The *Cone* of a live Heart being cut off, and the Point erected upward, the Blood will appear to be driven or propell'd from the *Auricle* contracted in the hollow of the Heart, but neither to boil or grow hot; this is firſt to be view'd about the time of Death: Theſe *Phænomena* hold true in the Blood of the left V*entricle.*

Neither does a *Thermoſcope* let into a live Heart inform us, that there is greater Heat in the Blood there, than elſewhere.

The *Chyle* in the *Thoracick Duct* taſtes more of the Sea Saltneſs, or elſe it retains that Taſte as predominant in the Food.

The ſame taken out, and mix'd with contrary Salts ſeldom or never makes an *Ebullition.*

Received in a Veſſel alone, it neither grows hot, nor ferments at all; neither does that appear in it, while it is contain'd in the *Thoracick Duct.*

Nay, tho' collected together there, and thence puſh'd into the *Subclavian*, and there mix'd with the B*lood*, it neither grows hot, nor ferments, no not in the Vein or the *Auricle*, or the V*entricle* of the Heart.

But from theſe Facts together with tying the *Axillary* V*eins* betwixt the *Cava* and the V*alve*, we cannot perceive the leaſt Efferveſcence.

At length, ſince the *Lympha* of the Conglobate glands is now mix'd with the *Chyle*, and that is the very Iſſue or Production of the *Arterial Blood*, the Nature of it is to be taken from the Nature or Diſpoſition of the ſame Blood, as to this Buſineſs, which is known alſo from the ſame Experiments.

Therefore there is no Ebullition, Efferveſcence or Fermentation in the Heart, whether you regard that, or the Liquors that flow into it; nor are we to hope for, or expect any thing of moment from thence.

Likewiſe the Heat of the *Heart* will not change the Diſpoſition or Motion of the Blood, as a new Cauſe neither will it drive it from the *Heart.*

For there is no Ferment in the *Heart*; therefore the Cauſe that drives or forces the Blood from the Heart into the *Arteries*, from the Veins into the Heart, is not ſeated in the Maſs of Blood, but is to be ſought for, in that which contains the Blood, which is the *Heart* it ſelf, therefore that ſuch Diſcoveries may be demonſtrated, we are accurately to weigh and conſider the Coheſion, Texture, Motion and Strength of the *Heart.*

The Fabrick, Strength and Action of the Heart.

THE Heart hanging free in the *Pericardium* by four large Blood Veſſels, moiſten'd with a ſlippery *Lympha*, reſting on the *Septum tranſverſum*, betwixt the Cavity of the *Mediaſtinum* in the Breaſt, not too much preſs'd with any thing about it, but being tyed to the ſoft Lungs is fitted for the moſt commodious Reception and Expulſion of the Blood into all Parts: It has two *Arteries* ariſing from the *Aorta* a little above the Semilunar Valves of the left Side, by an oppoſite courſe, compoſing one Canal joyn'd to the *Baſis* of the Heart in its whole Circuit, from whence ſending out Arteries, they unite among themſelves by various *Anaſtomoſes*, being diſtributed into innumerable ſmall Veſſels; they ſenſibly pervade every minute Part of the Heart, and together with the Veins compoſe or make up the whole Subſtance thereof: Theſe *Arteries* are in *Diaſtole*, while the reſt of the *Arteries* of the Body conſtitute a *Syſtole*: But the Veins ſend their Blood, partly into the *Coronaries*, and from thence towards the right *Auricle* betwixt that and the right *Ventricle*, partly within the right *Auricle* and the right *Ventricle* by particular Veins, agreeable to the new Opinions of *Vieuſſens*, *Ruyſch* and *Verheyen*; theſe Veins are emptied, while the reſt of the Veins of the Body are fill'd.

The *Heart* hath beſides theſe Veſſels *Fibres*, ariſing from four orbicular Tendons ſays *Lower*, that encompaſs the four Paſſages or Entrances into the Heart, and a great Part beſides that are inſerted in them, for there ſprings from hence. 1ſt, Small ſlender Fibres, in the right Road from the *Baſis* to the *Cone*, poſited thro' the outward Parts only of the right Cavity; with which the Fleſh of the Right *Ventricle* is ſhut in the *Syſtole*, and aſſiſted in expelling the

Blood. 2ly, Subject to theſe in the right *Ventricle* from the left ſide of the Heart, aſcending obliquely to the right, and terminating in the *Baſis*, they reſemble a Cockle ſhell in their Paſſage. 3ly, Others again lying under theſe, ſpreading broad from the right ſide of the Heart into the left, embrace both *Ventricles* in their Circuit, riſing up to the *Baſis* of the left ſide, they make an oppoſite *Helix* with the former Series of Fibres. Theſe are common to either *Ventricle*, being equally carry'd round them; they conſtringe both *Ventricles* with oppoſite forcible Contractions, perform'd at the ſame time, likewiſe compreſſing them againſt the *Septum medium*, they draw together the Point or *Cone* to the *Baſis*, equally moving on all ſides the Heart, with the Contraction of the Fibres. In which Action, they are aſſiſted by another Series of Fibres, which reſting upon the former by a various turning, and placed around they coerce and bind 'em in their proper Place. But the left *Ventricle* has ſtill two hard Series of Fibres proper to it, the outward of which, however Subject to the former, ariſing up throughout the whole Courſe of the left, ſpirally towards the right, and partly conſtituting the *Septum*, ends in the *Baſis* of the left, this intirely ſurrounds the Cavity, and hath again the like proper to it ſelf. Laſtly, There are others that are ſubordinate to this Series, which deſcending from the left *Baſis* towards the right, with an oblique turning or winding, make up the interior Parts of the *Ventricle*, and looſing the *Septum medium*, carry Fibres, that are viſible in their variety of Length, Flexure and Intortion. Beſides theſe there are carneous Columns, Holes in the Walls or Partitions of the left, which is the Reaſon that that *Ventricle* can be cloſely and ſtrongly drawn together by a common and proper Contraction; while the other Fibres and little Pillars ſeated in the Hollow or Cavity of either Ventricle, by reſiſting or thruſting forward in the *Syſtole*, and drawing back in the *Diaſtole*, ſerve inſtead of, or ſupply the Want of *Valves*.

Theſe Fibres, ariſing from the Nerves of the eight Pair entring in plentifully, within the *Aorta* and *Pulmonary Artery*, hence being inſerted into the *Auricles* and the *Heart*, by their Muſcular force, they occaſion the forming of the Cavity of the *Heart*, accurately or nicely conſtringing it without deſtroying its Texture, by a proper and forcible Action. Hence it is evident, that the left *Ventricle* is mov'd or acted by a proper orbicular Contraction, the right a ſemiorbicular, and that common to the left, as Inſpection into the Heart teaches us.

Therefore the *Heart* and its *Auricles*, are true Muſcles, and are acted by Muſcular Strength: Whilſt all the Fibres being made ſhorter at the ſame time, leſſen the length of the Heart, enlarge its breadth, exactly contract or draw together the Capacity of the *Ventricles*, dilate the tendinous Mouths of the Arterious Paſſages, determine them to ſhut and expreſs the contained Liquids with great force, thro' their diluted Mouths into the *Arteries*. This is the *Syſtole* or violent Motion of the *Heart*.

Moreover to ſhew how the Blood is expell'd and thrown out by this Muſcular Contraction, the leaping of it out upon cutting the *Pulmonary Artery*, or *Aorta* near the Heart in a live Diſſection teaches us: So it is puls'd out from the Heart, erecting the point upward, and cutting round about the *Cone*, by preſſing the Finger immediately into the Wound; there is a Swelling, Tenſion, Hardneſs and Paleneſs of the Fibres; Contraction follows, Impletion does not precede it; Depletion or Emptineſs attends the Shortneſs, Contraction or narrowing of the *Heart*.

If the *Nerves* of the eight Pair be tyed or cut aſunder in the Neck, the Motion of the Heart grows languid, there is a Palpitation with the greateſt Pain to the Animal, which in a ſhort time ceaſes. From hence is dated the Origin and Continuation of the *Syſtole*, which yet ſtands in need of the Blood of the *Coronaries*, in every Muſcle, and of that flowing in the *Cavities*, ſo by the *Syſtole*, the Blood being almoſt totally puls'd out of the *Cavities* of the Heart and its Veſſels, the Fibres Flag, are weaken'd, ſtretch'd out, or made longer, the Diſtance betwixt the *Baſis* and the *Cone* is increas'd, the Preſſure of the Walls on the *Cavities* is leſſen'd or taken away, the Valves of the venous Paſſage towards the point of the *Heart* are drawn together by the annexed Columns, the contracted *Auricles* fill the *Cavities* as well as the *venous Sinuſſes*, this is the *Diaſtole* or natural Reſt of the Heart.

For from that time we evidently know, that the *Cavities* of the Heart are fill'd with Blood, by opening of an *Artery* about the Heart, or cutting the Heart tranſverſly when erect, and then we ſee it admitting not caſting out the Blood; from Inſpiration of the Animal, opening of it at the time of Death, for then we may perceive a Relaxation by putting of the Finger into the Wound: Therefore the Blood doth not flow from the Heart upon the Account of Rarefaction: And a ſmall Quantity of *Chyle* added to a great deal of venous Blood, is mixed, divided, and ſhak'd together by the Strength of the Heart, and then the whole propell'd into the *Pulmonary Artery*.

The Structure, Force and Action of the Lungs.

WE are therefore to conſider the Fabrick or Texture of the Lungs, as to its Veſſels, and the Air and Blood that are contain'd therein; that from thence may be known the Effects happening to the *Chyle* and Blood in the Lungs. *Caſſerius* and

Ruyſch ſay, that its Air Veſſels are always naturally open from the chink of the *Glottis*, and form'd by the Concourſe or Meeting of the two *Arytænoide Cartilages*, ſpontaneouſly elevated from the preſſing down of the *Epiglottis*, and can emit or ſend forth Air by the Noſtrils or Mouth. But the ſame Chink depreſs'd by the *Epiglottis*, from the *Arytænoides* being contracted, by the *Thyroarytænoide* Muſcles, it hinders the Admiſſion, and is ſhut againſt any other Bodies but Air; but where it is dilated by the poſtick and lateral *Cricoarytænoide* Muſcles, thence it eaſily both admits and emits the Air.

From thence the cartilaginous *Aſpera Arteria*, ſeparated from the orbicular Segments, on the poſtick or back Part, and there furniſh'd with a ſtrong Membrane, being conected together with an able Muſculous Band, renders it ſo, that the Air hath always Liberty to go in and out at the gaping Pipe upon the ſmooth ſlippery Sides of the Membrane; that it may be capable of expanding round and give way to the Deglutition of the Stomach; that it may yield or be pliant to the bending of the neck; and laſtly, that it may be eaſily lengthen'd and ſhortned.

Afterwards, where it is cleft about the fourth *Vertebra* in the Breaſt, a little further it is divided into innumerable Branches, but more abounding with annular Segments, the Branches are poſited at acute Angles one after another, by degrees becoming narrower and finer: Laſtly, at their Extremities, with a cartilaginous Diſpoſition becoming membranous, being extended by the force of the Air, the folding Bags make little yielding Membranes, the Slips of which grow to every extream point, from which the Veſicles, the Lobes, and laſt of all the whole Lungs as to the Air Veſicles are form'd or compos'd.

If therefore the fluid, heavy, elaſtick Air admitted by the *Glottis* into the *Trachea* and *Bronchia*, blows up theſe Tubes, Branches and Veſicles, the orbicular Largeneſs and Length of the Pipes will be increas'd: The Branches will riſe into greater Angles; the Lobes are erected, the Viſicles from a flat Figure by Complication are extended into a round one. Hence the Spaces will be enlarg'd betwixt the ſquammous Segments, the Branches and Veſicles, and the Points of Contact leſſen'd.

After this, the *Pulmonary Artery* growing preſently curved from its Riſe out of the *Heart*, is divided into innumerable Branches, diſtributed with thoſe of the *Aſpera Arteria*; it compaſſes the Superficies with the laſt Branches, by the Net work Texture of the *Veſicles*, poſſeſſing the middle Spaces betwixt theſe, after the like manner, which are call'd little Cells, and there abounding with an infinite Number of Arterial Inoſculations, proceeds into the Veins.

Which, as *Ruyſch* obſerves, from the like bending or winding of the Artery, the Blood is ſo conveyed and changed, that the overflowing Secretions being ſcarcely diſtributed, they are brought back into the larger *Pulmonary Veins*, into the four great Veſſels, by theſe into the *venous Sinus* of the Lungs, from thence into the left *Auricle* and the ſmooth Cavity.

From which Texture of the Lungs, and their Mutation by the Air, together with the ſwift thorough Paſſage of the Blood and *Chyle*, are underſtood the Effects produced in the chylous Blood by the Action of Reſpiration, to wit; firſt that that Humour by the immediate Force of the Pulſe of the right *Ventricle* of the Heart, is thruſt or compreſs'd into a crooked, conick, flexible, elaſtick Pipe, there being thicken'd and chang'd in the Contact of the Particles, and in the Figures or Form of theſe the Fluid is diſſolved, broke in pieces, or maintained and held together.

Secondly,

Secondly, From the Motion of the Veſicles inflated in the Lungs by Inſpiration, leiſurely preſs'd in fewer points; from the Change of the cellulous Spaces at the ſame time ſucceſſively more encreas'd, from the Motion of the Veſicles and their Spaces, ſucceſſively and by little and little leſſen'd in Expiration, from the Elaſticity of the Air, retain'd after Inſpiration or Expiration,from the aſſiduous Increaſe by Heat that is perform'd; that for two moments ſucceſſively together; neither the Arteries nor Veins, nor Blood, or any other Humours in whatſoever Veſſels of the Lungs, are ever equally or after the ſame manner compreſs'd; but all ought to be adapted to the conveying Canals, which follow through the Lungs, by being reciprocally preſs'd, driven, conquaſſated, remitted, ground, broke to pieces and reſolved.

Therefore 3ly, the *Chyle* is prepar'd in the Mouth, wrought in the Stomach, elaborated in the Inteſtines, ſecreted in the Lacteals, diluted by the Glands in the *Meſentery*, yet more ſo, from the Chyliferous Duct of the *Thorax*, jumbled together in the *Vena Cava*, accurately mix'd, ſoluted, attenuated and ſubdued in the *Auricle*, and the right *Ventricle*; ſtrongly ſqueez'd or preſs'd in the Conick and Cylindrick Canals of the *Pulmonary Artery*, and configurated into the Form of the ſolid and fluid Parts throughout the whole Body.

4ly, It is exactly mix'd again in the *Pulmonick Veins*: And 5ly, By the *Lympha* in this Place, as demonſtrated in the Blood, alter'd in its proper Organs, it is diluted in the ſame Veins. 6ly, It appears to be endowed with an apt Form for Nutrition: Then 7ly, Its Heat and Fluidity are preſerved. 8ly, Thus is made the higheſt Mixture of all the Humours and Particles of the whole Body, both new and old. 9ly, And here ſeems firſt of all to be the Riſe or Spring of that red Colour, which is the Property of good Blood.

But whether the heavy Parts, and the elaſtick ones of the Air, are mix'd here with the Blood, for the vital elaſtick Oſcillation, as the Famous *Borellus* teaches? That cannot be done in the Arteries, neither is there any Argument why it ſhould in the Veins. But the Air compreſſing in Inſpiration, is believed to paſs thro' the Veſicles or Bladders by extending the Veins: The compreſſing Force of the Breaſt binding the Veins in Exſpiration; here is a ſingular Commutation of the *Artery* into a *Vein*; the Paſſage of the Air is difficult into the ſmall Pores or Holes that are pervious to Water, Oil, and Spirits.

The Blood is brought hither to be expos'd to the Air, either as a Refrigeratory, to expel the fuliginous Vapours, or to endow it with Spirits according to the Schools: But ocular Demonſtration, Anatomy, and the Uſe of the *Thermometer* prove otherwiſe.

But whether we may admit the Blood of the right *Ventricle*, by reaſon of the fervid Effervеſcence in that Part, that is almoſt ſcalding or boiling hot to be condens'd, extinguiſh'd and refrigerated by the cold nitrous Air in the Lungs; for *Sylvius* and moſt of the Chymiſts were of this Opinion, but Experience reclaims it; or whether the Blood gains its Purple Tincture, from the ſubtil nitrous Air mix'd here with that Liquor, as the great *Lower* wou'd have it, yet Truth does not much favour him.

As we may learn from the former, ſo we may from the Event, that the *Chyle* is rather confuſedly jumbled together in the right Cavity of the Heart, than accurately mix'd with the Blood; for we ſee it intimately united in the left *Ventricle* of the Heart, and know it able to perform all its Operations from the Strength and Efficacy of the Lungs. After being thus chang'd, it flows from the ſtrait Arterial Canals into the broader Veins, it is puſh'd on by oppoſite Motions, is leſs preſs'd, but rarifies much more, hence growing more frothy, florid and red, it returns into the left *Ventricle* of the Heart, by this means a great Part of it is mixed again in the left *Auricle*, where it remains fluid, and is hindred from Concretion and ſeparating into Parts.

The Chylous Blood hardly reſting in the left *Ventricle*, being puls'd by the ſtrong and ſwift force of the *Syſtole* into the great *Artery*, protrudes whatever is before it, and ſo moves all. Therefore the Efficacy or Power of the Lungs is of much greater moment, than that of any other of the *Viſcera*; becauſe the whole Quantity of the Vital Fluid paſſes thro' them, while only a certain Part or Portion flows thro' any of the reſt: Nay, farther here is Preparation made for Nutrition, becauſe all the *Chyle* is brought hither, then in the firſt Place, this is the Office or Laboratory of the Blood, where it is made fit to flow thro' the ſmalleſt Veſſels, which it could not otherwiſe do; wherefore it is moſt aptly prepared for Secretion; and laſtly, for exerciſing all other Actions, which are neceſſary to be perform'd towards the Subſiſtence of Life and Health.

All theſe Things follow from the Diſpoſition or Nature of the Blood and *Chyle*, as laid down, allow'd, or preſuppos'd, from that of the Structure and Action of the Lungs, from the ſuppos'd Strength of the Heart, and the Force of the heavy, fluid, elaſtick Air, on the configurated Air Veſſels of the Lungs, together with thoſe of the Blood. Therefore, what need of the Admiſſion of Air or a Ferment? Thoſe who are deſirous of knowing more on this Subject, muſt conſult the Works of the Learned *Bellinus*, *Pitcairne* and *Malpighius*, who are excellent in their Enquiries into the Nature, Structure and uſe of the Parts.

The Strength of the Artery, *and its Action on the Fluids.*

THat thoſe things may be farther underſtood, which relate to the Pulſation of the Blood and *Chyle* into the *Aorta*, and its remoteſt Branches, we ought to regulate our ſelves by the *Hydraulick Laws*, with which the Fluids are directed by a ſuppos'd Swiftneſs thro' known Canals, and lead about towards a definite End: For theſe are otherwiſe demonſtrated, and common to any Liquor moved thro' any Veſſel. Their Swiftneſs are here meaſur'd from their Cauſes and Effects obſerv'd by the Senſes, or known by good Reaſon, but Canals are known from Senſe, Microſcopes, Injections, Reaſon, or by this Rule, as things either ſenſible or inſenſible in a Human Body.

Therefore the *Artery*, by the Force of the diſtending Blood, is expanded, but when that ceaſes, it naturally returns to its former Capacity; for the Finger thruſt in forcibly, is much ſqueez'd, but taken out again, it contracts of its own accord; in a live Animal the *Artery* appears full, in a dead Body ſmall and almoſt empty; it reſiſts being diſtended when blown into, and ſtrongly repels the Impulſe of the Air; ſticking in the ſmalleſt Diameter of its Contraction it is at reſt; wherefore its contractile Power depends on the Nature of the Fibres, and the little replete Veſſels conſtituting the Membranes of the *Artery*.

Neither is there any ſenſible Particle in the whole Body, but it hath a ſmall or minute *Artery*, as ſlight Wounds informs, or we may learn from the *Microſcope* and *Injections*, according to *Leenwenhoek* and *Ruyſch*; yet all theſe are but leſſer Branches of the *Aorta*.

The Blood filling the Arterial Veſſels, ſtops its Pulſation into the *Aorta*, the Conick Figure of the *Artery*, its Curvedneſs and Elaſtick Spring; the ambient Bodies preſſing with their Weight, and laſtly, the Narrowneſs of the *Capillaries* or remote Veſſels does the ſame; therefore it flows thro' the Veſſels from the Exceſs of the Heart's Strength, beyond thoſe aggregate Bodies that reſiſt; from whence it is apparent it may be driven thro' the Lungs with leſſer Force of the Heart.

Yet the Strength of the Heart is accounted great, let us compute which way we will,as the quantity or plenty of the things moved inſtruct us; therefore becauſe the whole Maſs of Blood is at all times agitated with ſuch Force, and repell'd or driven back with ſuch a mighty Obſtacle, in a full, conick, flexible, and ſtrong reſiſting Canal; it neceſſarily follows, that the *Diaſtole* of the *Artery* is perform'd at the ſame time with the *Syſtole* of the Heart, that appearing not natural but violent to the *Artery* which is natural to the Heart. In a State of Health, there ought to be a Fullneſs of Veſſels every where at the ſame time; to be felt, where the Artery is found large, naked and ſupported by a hard *Baſis*.

And while the Force of the *Artery* is ſtrongly thruſt back again, contrary to this *Diaſtole*, and alſo the Power of the ambient Parts, aſſiſts that Reſiſtance: The *Artery* thus ſupported, will neceſſarily puſh on the Blood, otherwiſe at reſt, by the ſtrong ambient Bodies with that Energy, whereby it contracts it ſelf; from whence the Blood will flow with a continued Stream, tho' with leaping, and this is call'd the *Syſtole* of the *Artery*, timed equally with the *Diaſtole* of the Heart, which is natural and not violent to the *Artery*, aſſiſted by the Return of the *Valves* of the *Aorta*, and the flaccid Emptineſs of the *Coronary Arteries*.

Theſe Motions are two-fold, which the Phyſician calls the Pulſes or Beatings of the Arteries, in which the Strength, Plenitude, Number or Equality conſiſts, or their contraries; yet ſo, that the ſame are ſcarce common to two healthful People at the ſame time.

From hence the Blood being puls'd from the Heart with an oblique Force, it is thrown to a very acute Angle on the ſides of the *Aorta*; preſſing there it runs in almoſt with its whole ſubſtance into the crooked or curv'd Part thereof, from the Figure and Form of which, as well as the Reſiſtance of its Weight, it is preſs'd back again, therefore in every moment of time, ſome Particles of the Blood, gain another Motion, Rotation, Attrition, Attenuation, Denſity, which are chiefly homogeneous to all, and from theſe follows the Fluidity, Heat and Colour of the whole Maſs; a Diviſion of Particles is made and accommodated to all the Veſſels, hence Obſtructions are hindred or prevented in the Capillaries; all which are aſſiſted by the *Anaſtomoſes* or *Inoſculations* allowed of by *Leenwenhoek* every where, and by *Ruyſch* almoſt in all the leſs and minuter *Arteries* of the Body.

But if all theſe ſhould contain Blood in them, and yet want the Motion of the Heart and Arteries, the Blood wou'd ſoon thicken and approach more to the Nature of a Solid, but while it is urged on from its Cauſes, it remains apt or diſpos'd for Life.

But becauſe the *Arteries* increaſe by degrees in Number and Size, in one place narrower or ſtraiter, in another broader, in all times and places many things are loſt not to be reſtored; in the ſmalleſt Veſſels the greateſt Reſiſtance, and that impreſs'd Force is communicated to many ambient Parts: Therefore the Motion of the circulating Fluids, *cæteris paribus*, will be ſwifteſt about the Heart, and floweſt in places more remote.

The Nature, Parts and Phænomena *of the Blood.*

BUT in the Blood it ſelf, the great Cauſe of this Diverſity lies hid in the Velocity, and in the very Paſſage thereof; and becauſe there are various things therein, its Origin muſt inſtruct us; the ſpontaneous Seceſs of Reſt, adhering without the Veſſels in a vaprous, ſerous, fibrous Form, and the *Chymical Analyſis*.

Therefore there are in the Blood, firſt, things that are moved, or moveable by the leaſt Force, as the ſmooth round Solids; 2ly, what are ſlower or duller, and not moveable with little or ſmall Force, as things porous, angular, rough and viſcid, from whence we are taught by Hydraulicks, Hydroſtaticks and Mechanicks, that the Parts of the Blood are puls'd with the ſame common Strength of the Heart, and not mov'd with Velocity, Continuation and Direction; for the firſt recede from the Heart in a direct way, with a great and conſtant Speed, but the latter much ſlower, being drove thro' the Veſſels obliquely or backwards.

But why ſhou'd the Blood remain ſome time fluid in the Veins of a dead Body, and yet coagulate quickly in the Heart and in the Arteries? Becauſe perhaps the moſt fluid Humors being preſs'd, flow aſſiduouſly into the Veins, and nothing exhales from them, when the Fluidity is loſt in the Arteries, neither does any thing return into them.

And tho' the Blood appears in Life every where alike red; yet viewing it by Microſcopes, it conſiſts of red Globules that ſwim in a thin ſubtil Serum that is almoſt pellucid; ſo that the Balls blown up or form'd out of the ſix leſſer things, are red, but reſolved into Parts, they transform themſelves into the Nature of a pellucid Serum, of which there are various Colours. Whence Matter, Subſtance, Figure and Colour are converted into Water; it is more difficultly underſtood, how this Diviſion is extended into leſſer Globules, but it is known what the thicker red, and what the ſerous make, and therefore why they are ſo neceſſary in the Blood of a ſound robuſt Man.

But from theſe things it will be eaſy to explain, what we ought to think of the *Galenical* or *Chymical* Doctrine, in accounting for the Nature of the Blood; and conclude that the Variety of Blood in various Bodies, and from thence the Temperaments of different Men may be better underſtood, and deduced from Water, Salt, Oil and Earth; in the mean time it is clear *à poſteriori*, that the Motion only of the circulating Blood can perform and preſerve its Mixture, Fluidity, Heat and Redneſs; while Encreaſe or Decreaſe, the Abſence or Preſence thereof maintains or deſtroys it. Wherefore there is ocaſion to look into thoſe things, which are done, while this Blood and Chyle is brought by the Force of the *Heart* and *Arteries*, into the *Arterial Capillary* Veſſels about the ſmall Veins, Glandules, Muſcles, excretory Organs and *Viſcera*.

The Nature, Diſpoſition and Force of the Arteries entring into the Brain and Cerebellum.

First of all we are to have regard to the Riſe and Courſe of the *Carotid Artery*; the *Aorta*, ſaith *Ruyſch*, ariſing from the left ſide of the Heart; ſoon after is carry'd upwards, and then forms the

Subclavian by an Archwiſe bending in the right Side, to which the right *Carotid* adhering for ſome ſpace, it riſes as if it derived it ſelf from this *Subclavian*; but the left is erected from a ſingle Arch. Preſently both of them being defended by a deep Situation and the *Aſpera Arteria*, free from crooked Windings and Compreſſion, ſcarcely ſending forth any Branches, they reach the *Cranium* in a direct or ſtrait Courſe; where being almoſt arrived, they beſtow, according to *Bartholin*, an external *Carotid*, as *Lower* ſays, furniſh'd with an *oſſeous* or bony Canal, winding or turning forward, laid down with a muſculous Membrane, giving Branches with *Ridley* to the *Dura Mater*: Within the Brain they are defended from the *Sellian* Sides, and the Riſe of the *Dura Mater*, after they are ſent forth into the exterior Parts of the *Pia Mater* and the Nerves; and then are committed to the Brain, by means of the *Pia Mater*, where preſently they are divided into lateral, anterior and poſterior Branches.

But the *vertebral Arteries*, which *Cowper* mentions in his Appendix to *Bidloe*, being ſtretch'd upwards from the ſuperior Part of the *Subclavians*, are preſently receiv'd among the ſeven lateral *Foramina* of *Veſalius*, there defended, and brought to in a direct Road, being ſupply'd with a vaginal membranous Covering, where they iſſue out from the *Foramina* of the *Vertebræ*, immediately under the ſuperior Proceſs, made crooked, according to *Cowper* and *Ridley*, from the poſterior Bending back of the firſt *Vertebra*, and there made broader, they enter in by the great *Foramen* of the Skull, are united, ſays *Ridley* and *Ruyſch*, by laying down a groſſer Membrane, then joyn'd to the *Carotids*, it is preſently divided after a wonderful manner.

Therefore the Four *Arteries* going out from oppoſite ſides into mutual Apertures, as *Ruyſch* ſaith, and ſo ſet together in an orbicular manner, from whence they preſently ſend out Branches, which meeting with others of the like nature, they again form ſuch leſſer Circles, and by the ſame Artifice ſeeming to be divided thro' the whole Superficies of the *Pia Mater* into Subdiviſions, they almoſt diſappear, that this whole Membrane is chiefly made up of this Texture.

After this manner, from a *mechanical Apparatus*, all the Blood is moved or driven from the Heart, which comes to the thin, ſlender Membrane of the *Brain* and *Cerebellum*, and from thence to the Subſtance of both theſe, for the remaining Blood which is driven into the *Cranium* by the Two *Arteries*, ſays *Ruyſch*, ſpringing from the external *Carotid*, entring from thence by a ſingle *Foramen* into the Skull, and diſtributed in the hard Membrane of the Brain, properly ſaid to be the groſs Integuments of the *Cerebrum* and *Cerebellum*, as the Veſſels ſhow us when fill'd with Wax, from the accurate Induſtry of the famous *Ravius*.

From whence we clearly diſcern, that the Blood before deſcrib'd from its ſingular Condition, how greatly ſoever retain'd in this Diſpoſition, being brought to the lower *Superficies* of the *Baſis* of the *Cranium*, is there freed from the Matter of the *Saliva* and *Mucus*; or purified from the tenacious Blood given to the *Vertebræ*, blunted by the Flexure of its *Artery*, refined ſlowly in the Caverns made by the Sides of the *Ephippium* from the *Dura Mater*; and by oppoſite Strokes it runs into the Veſſels, thro' the reſt of the *Arteries*; from whence, firſt, it preſerves its own proper Nature, or acquires a greater Purity, the too great compreſſive Shock or Violence weakens the ſoft Pith of the Brain. 2ly, An exact Mixture of all the Blood brought hither, is perform'd, and therefore the greateſt Likeneſs of it in every Part. 3ly, Attenuation, Levigation, Trituration, Fluidity, an Aptitude or Readineſs for

Secretion, and an Impediment to Concretion. 4ly, A leſſer Vibration of the *Arteries*, and leſs Action of theſe upon the Blood. 5ly, A Supply of the Defect ariſing from the Unfitneſs of the larger and leſſer Veſſels, fram'd for tranſmitting of Liquors, when there is a free Courſe from every ſide, into any of them.

The Cortex of the Brain.

BUT thoſe very *Arteries*, interwoven after ſo ſtrong a mannner in the fine ſlender *Meninges*, as *Ruyſch* calls it, as in a *Baſis*, ſend forth Branches, according to him, from every Part thereof, with almoſt a perpendicular Courſe, being made up of ſuch alike *Apparatus* of Inoſculations, as furrowing Rounds and Turnings on the Membrane by its Inſinuation, and making them deep, into which the exterior Subſtance of the Brain and *Cerebellum*, is divided almoſt to the very Marrow it ſelf. But thoſe Tracts, being wound or turn'd round after the manner of the Inteſtines, may yet be reſolv'd into others leſſer, yet like the former. The Subſtance laſtly, that lies betwixt, exceeding the greateſt part of this and what is in the *Cerebrum* and *Cerebellum*, being fill'd with an Injection of Wax then ſteep'd in Water, and freed from every Part not full; there will appear an Heap of Veſſels, like a Lock of Wool, that are ſmaller, ſofter and more ſucculent, being diſſolveable with the leaſt Force, melting in Spring Water, by hanging only therein, into a pulpy Humour.

The exterior Part, according to *Vieuſſens*, is cineritious, or of an aſh Colour, ſoft and moiſt, and this Subſtance is call'd the *Cortex* of the *Cerebrum* and *Cerebellum*; it binds in or encompaſſes on all ſides curiouſly, the whole Origin of the internal Subſtance that is whiter, more ſolid and dryer, which is called the *Medulla* or Marrow of the *Brain* and *Cerebelle*; ſo that this in the firſt place appears plainly to ariſe from that on every ſide, both in the *Appendixes*, *Ventricles*, *Crura* and *Medulla oblongata*; but in the inward part it is like the *Cortex* of the *Medulla ſpinalis* or ſpinal Marrow, but of a cloſer Subſtance. Tho' in the *Cerebelle* this is ſo clear, that the manner how the Marrow proceeds from the *Cortex*, is made very evident from the Diſtinction, Proportion and Texture thereof.

Therefore ſince from every ſingle Stroke of the Heart, a very large Portion of Blood, which *Malpighius* reckons a third of the whole, is driven from the *Cortex* with a great and direct Force, that will be agitated at every *Syſtole* and *Diaſtole*, tho' it be very ſmall. But likewiſe there ought to be venous Ducts every where poſited at the Ends or Extremities of the *Arteries*, tho' they cannot be made viſible, thro' the Fineneſs of their Membranes and their Subſtance: There ought alſo to be certain ſecretory Ducts, at the extreme *Capillaries* of the fineſt *Arteries*, tho' theſe are not viſible.

This Minuteneſs of the Parts makes it, that Reaſon with all its Endeavors is not ſtrong enough to ſupply what Inſpection denies, as ſeveral have thought; yet the Opinion of *Malpighius* chiefly, being every where received, led us into this altogether from the Fabrick of the Gland, till the accurate *Ruyſch* publiſh'd the contrary, who is a Man excelling all in diſcovering, explaining and preſerving the minuteſt Arterial Veſſels of the Body, whatever is to be taken notice of from the Glands, muſt be had from the eminent Diſcoveries of *Silvius*, *Steno*, *Wharton*, *de Graef*, *Malpighius*, *Billinus*, *Borellus*, *Peyerius*, *Ruyſch*, and *Nuck*.

Of theſe, firſt, ſome are ſimple Glands, others compounded, many of theſe ariſing from thoſe, while aggregated or joyn'd together, they are cloth'd with a common Membrane. 2ly, The ſimple either mix a proper Humour thro' their Lymphatick Ducts, with *Chyle* or venous Blood; or they exhale into the exterior Parts of the Skin, or the Superficies of the opener Membranes to be found every where throughout the Body: But the compounded Glands emit their Humor or Liquor made in every ſingle, Part, from thence, thro' their little Canals into the larger Ducts, and by this common Emiſſary, at laſt they break into the greater Cavities of the Mouth firſt and the Inteſtines, or elſe out of the Body it ſelf into particular Uſes; the firſt are call'd conglobate, and the latter conglomerate Glands.

The ſimple Glands are compos'd of, firſt, a certain exterior and thin Membrane, to which another being plac'd under, ſtrictly adheres: The former incloſes, binds, and compreſſes it on every ſide with its circular Elaſtick Fibres; chiefly conſiſting of a Texture of ſmall Veſſels going in and out: The latter is indeed thick and ſtronger, with Fibres appointed for almoſt every Turn and is made up of an intricate Texture of Veſſels, which ſerve it formly for the ſame Uſes. 2ly, Theſe Glands receive Arteries, the Branches which they diſtribute and maintain in their Membranes by an orderly and fix'd Series, ſo accurately or nicely brought to every minute Particle of the Gland, that Wax or Quickſilver being injected, increaſes the little Arteries, by compreſſing the other Veſſels, that it ſeems falſely to teach us, that its whole Structure was only *Arterial*. 3ly, Theſe Glands have Veins diſpos'd in the like Courſe with *Arteries*. 4ly, They receive many Nerves and thoſe greater than any other Part of the Body, of ſuch a Size which are likewiſe ſo divided in this Corpuſcle, that they ſeem to enter the reſt. 5ly, They have laſt of all receding and communicating Lymphaticks, according to *Nuck.*

But theſe Canals of the *Artery* are conick, inflected, ramous, elaſtick, wound round or wrapt up, and in the Extremity Cylindricks, not branching further, but are now chang'd into Veins; but before they are thus chang'd, the little Arteries, by infinite Inoſculations and various Poſitions, ſo communicate amongſt themſelves to innumerable Angles, that as *Ruyſch* ſays, theſe extreme Ends terminate differently in different Glands.

Therefore great Motion happens from the *Arterial* Blood, being driven to the Glands; vaſt Reſiſtance; Compreſſion; mutual Preſſure on the Parts; oblique Preſſure; an aſſiduous thorough Change of touching; Application every where manifold, and that to the leaſt or ſmalleſt Points of the Canals; various Rotation every Moment in ſome particular Part; oppoſite or contrary Preſſure, departing into the Branches; but returning into the ſame, Attenuation, Attrition, Conſervation of Fluidity, Solidity, Smoothneſs, Secretion, Mixture.

In the mean time, moſt part of the Branches ariſing from the Trunk of the *Artery,* are more compreſs'd, ſtopping in the ſame Place, ſo it is in the minuteſt; and therefore the extreme Branches are leſs in the extreme or laſt Trunk; the laſt Trunks tranſmit the red, thick part of the Blood, which they depoſite into the Beginnings or Entrances of the little Veins; the ſtraiter or narrower Branches receive the thinner, more fluid, pellucid Parts, leſſer in the Diameter of its opening, being preſs'd by an oblique, ſtrong oppoſite Force.

But this ſubtil Humor, ſeparated from the groſs or thick Part, is not the Blood it ſelf, but ſomething elſe different from it; Sweat, perſpirable matter of the Pores, Tears, Ear-wax, Mucus, Spittle, Snot, Lympha, Serum, Bile, Semen, Oil, Milk, Fat, *&c.*

Furthermore, the laſt Branches are term'd *Arteries* from the Nature of their Fluid, and are often endowed with the Properties of an *Artery*, having the fineſt ſubtil *Arterial* Branches, as well as *venal* ones: Hence Veins and *Arteries* are of equal Uſe to the *Lymphaticks*, as to convey or carry Blood; neither is it known where the End of their Progreſs is, but only as we underſtand the Origin, Progreſs, End and Function of the Lymphatick Veſſels.

Yet the Branches perhaps of ſome ſuch like *Artery*, not ſo much branching, as ſtrait, and diſpoſed in a fine thin Membrane of the ſmalleſt glandulous Bag or Veſicle, their Mouths being open in the end, they ſpue out their Liquors into a common Cavity made from that little Membrane, where being collected on all ſides, it adheres ſomehow, and is that glandulous *Lympha* there made and gather'd together.

But credibly it may make the Nerves of the Glands from ſuch alike *Apparatus*, ſpue out their Spirits, and mix them with the *Lympha*, and ſo ſupply thoſe Duties that depend on its Nature. In the mean time, the Lymphatick *Arteries* often bring their *Lympha* deliver'd from their valvulous little Veins, call'd the vaſculous *Lympha*, to theſe Glands, and ſend it by a different Preparation of the glandulous *Lympha* into the ſame Bag, and mixing with the Spirits, render what is ſent in more ſubtil. Then that compounded Humor paſſing thro' the Lymphatick Veins, agitated by the contractile Force of the fibrous Membrane, the Motion of the *Artery* and Preſſure of the Muſcles, is puſh'd into other Glands that are there, at length paſſing it into the Ciſtern upon the Loins, the Thoracick Duct, or the ſanguiferous Veſſels of the Body, and theſe conglobate Glands are ſeen throughout the whole Body.

But there is another Reaſon of other things, while that little Bag or Bladder expells its received

Liquor immediately by its Emiſſary into ſome common Cavity; as into the frontal *Sinuſſes*, the Hollows of the upper *Maxilla*, the little Cells of the *Sphenoide* Bone under the *Ephippium*, the lurking Holes of the ſpongy Bones in the Noſe, the Cavities of the Noſtrils, the Furrows or Trenches of the *Tonſillæ*, a ſecreted *Mucus* is depoſited, collected and chang'd: So the Paſſage of the Mouth, the Ear, Jaws, *Larynx*, *Aſpera Arteria*, *Bronchia*, *Gullet*, *Stomach* and *Guts*, appear to have in the mucilaginous Glands; which may be call'd *ſimple excretory ones.*

There are others again with the like Appearance, that emit digeſted Humors thro' proper Emunctories, ariſing from a Cavity that is without or upon the Skin. Hence we may take notice of the diſtance of the *Artery* from the Heart, its Situation in reſpect of the Heart, and the Trunk from whence it ariſes, its various Complication, the different Swiftneſs thro' it, the ſingular Proportion of the Branch to the Trunk, as well as the different Force expreſſing within and without, the Stoppage or Teſt of the Fluid in the common Duct; the Diſtribution thereof into Places that change or alter the Humors again by their Structure; the moſt liquid Part of the ſecreted being exhal'd or ſeparated, makes it ſo, that from the ſame Blood, a Humor abounding with great Variety is ſecern'd in different Places, and the ſecreted wonderfully chang'd.

Thoſe Cauſes that are different in different Parts of the Body, either alone or combin'd are diſcover'd in the very Structure it ſelf, naked or expos'd to the Senſes, or are deduced from the Fabrick, with the greateſt Evidence by certain mechanical Laws, and by the eaſy Knowledge of the Nature of the Humors in all, from whence then may be underſtood the innumerable Species or Kinds of Secretions and things ſecreted.

Further, not to puzzle the Cauſe with Fiction, we do not allow of Pores, to be endowed with any certain, various or immutable Figure, eſpecially ſince it is repugnant to the Laws of Nature to allow of any ſuch; much leſs to be an Advocate for any conceived Ferments, from a kind of thick or fluid Maſs; or any other Fermentation, Precipitation, Coagulation, Aſſimulation or Alteration; ſince for theſe there can be aſcribed no Cauſe, original Matter, Place, Mixture, Efficacy, Proportion, Durableneſs, Effect or End.

But from theſe ſimple Glands deſcrib'd, or from others like to them, united among themſelves by common Veſſels, and all together connected by a common Membrane, are produced compound Glands, call'd *conglomerate*; in theſe there is chiefly one common Emunctory, which receives the Humor ſent in from the reſt of the Emunctories of the Parts, collects or gathers it together, and pours it out into ſome large Duct or Cavity: Such are thoſe of the *Innominata* of the Eye, the *Parotid* and *Pancreatick Duct*, together with that common Receptacle ending in an *Emunctory*, which often goes as it were into an *Arterial* crooked Veſſel, changing or altering the Humors, and from thence pouring them out by an *Arterial Apparatus* into an open Channel, as in the muſculine *Teſtes*, in *Highmore*'s Duct, in the *Epididimis*, the *Vas deferens*, and the *Seminal Veſicles*; or 2ly, it preſently breaks out into the common Emunctory.

Here we ought to know, that by Aſſiſtance of the Glands, there is ſeparated from the *Arterial* Blood, Water, Lympha, and a thin Serum, and with theſe are mix'd Salts, Spirits, and the ſubtil Parts of Oils; but all theſe things, either ſtagnating in certain Places, are chang'd and accumulated, or elſe are driven thro' the leſſer Veſſels, even to the minuteſt Parts of the Body, ſerving for Motion and

Nutrition; from whence they either return by the little Veins into the Heart, or elſe are exhaled; laſtly, that Part of the Blood, which after this Labour remains in the *Arteries*, enters the Veins, which by little and little grow wider, in order to be mix'd with the like Blood, to be diluted with the *Lympha*, and return into the Heart.

Wherefore the *Arterial* Blood being moſt diluted about the Heart, grows by degrees thicker in the End of the *Artery*, that is in the Beginning of the Vein thickeſt, eaſily concreted, and is highly viſcous; therefore it requires an unactive Veſſel to prevent it, and the Mixture of a diluting Humor, that is, the *Lympha*, which performs it by its Office, and the Return of the Spirits towards the Heart: But theſe things ought to happen before it is puls'd into the *Pulmonary Arteries*; for otherwiſe the Blood wou'd be ſufficient to do it with one ſingle Circulation only.

Hence we ought to know the Place where the Certainty of Life and Health are chiefly to be tryed or hazarded; to know what Service the larger Veſſels, the groſſer Humors, the ſmall Veſſels, and the fine or ſubtil Humors afford to the Strength, Hardineſs and Flexibility of the Body; to underſtand why the Veins by degrees more open, yielding to the Concourſe of Humors, and apt for Dilution, perform theſe things before the new Return of Blood into the Heart.

But ſome Glands ſeem to be form'd from another Structure; ſo that the *Artery* conveying the Humors, gives a thicker Blood by a ſocial Vein, that opens by *Anaſtomoſes*, from the Artery into the Vein; but going on from thence alone, and complicated in Windings and Turnings, from its laſt Mouth it throws into the common Receptacle a ſingular Humor, prepared and riſing from the Blood, but diſtinct or differing from it.

Therefore ſince *Hippocrates*, *Wepferus* and *Malpighius*, have diligently compar'd the *Cortex* of the Brain, with the Structure of a Gland, being convinc'd by the Eye from the plain Reſemblance, they were of Opinion, that the *Cortex* was really glandulous. But *Malpighius* hath defined theſe Glands to be angular and of an oval Figure from the Compreſſure of the neighbouring or adjacent Parts, poſited crookedly and ſmall, being tyed together with others, firſt of all making them a little bigger; from hence again growing large, at laſt from a Collection of theſe together, making a Subſtance like the Convolution or Winding of the Guts, and from theſe the outward *Cortex*; ſo that the minuteſt or ſmalleſt Sprigs of the *Carotid* and *Vertebral Artery*, being here wound up into the Structure of a Gland, by their infinite fine Mouths they may exhale a ſubtil Humor from the approaching Blood, filling drop by drop from its little Bag or Bladder, from thence afterwards is driven into the Emunctory, and from that by the little Veins reduced into the *Sinus*.

The Eye and Microſcope both favour the Opinion of *Malpighius*; Boiling divides the Brain as it were into little delicate Subſtances like Glands; a Deterſion of Ink being poured on the *Cortex*, deſcribes little Pieces diſtinct with Clefts or Chinks; the Concretion of a morbous Brain into a Stone, is like a Mulberry; the Corruption of the ſame contuſed, by opening of the broken Skull, is like a glandulous *Fungus*; the Change of the Parts conſtituting the outward Brain by a *Dropſy*, as into plain little Globules or ſpherical Bodies.

But whether that laſt extreme little Branch, is rather it ſelf made from a ſtrait Continuation of the fibrous Part, afterwards drawn out, as the Origin of the Subſtance of the Brain, as appears from *Ruyſch*, we can draw no certain Argument, becauſe of the Fineneſs, the Extremities thereof vaniſhing from the utmoſt point of our Eye ſight. Yet it is highly probable, this Opinion ariſes from many and weighty Reaſons, at leaſt the Effects may be underſtood to be almoſt the ſame in either Caſe.

For this reaſon thoſe laſt Sprigs or Branches, or thoſe glandulous minute Bags according to the ſame Author, ſend forth fine white compact Fibres, with which being united together, is made the callous medullary Body, to which the *Cortex* growing to, lies upon it, and is knit to it, as well in the Brain as the *Cerebellum*; ſo that there is no end of the cortical Subſtance, where the Beginning is not likewiſe to be found of the ſame callous medullary Body.

But that cortical Machine ſo accommodates it ſelf to the medullary Body, that it increaſes not extrinſically by the ſame means in the Brain and the *Cerebellum*; but it accompanies the laſt *Appendixes*, ſaith *Malpighius* of the callous Body, the *Ventricles* of the Riſe of the ſpinal Marrow, and the oblong Tract of the ſame without the Brain; yet ſo that the encloſed *Cortex* according to *Ruyſch*, ſticking betwixt the medullary Part and the *Sinus* intercepted in the middle, it is irrigated or water'd with a numerous Quantity of Arterial Veſſels.

And therefore in all Parts of the Head, where the minuteſt *Arteries* that are ſcarce viſible with inviſible Veins, that are yet ſo neceſſary as to be admitted here, run together; there this cortical Subſtance is found, both in the Receſſes, Circumvolutions, openings Interſtices, and Appendixes, as in the external Superficies, in regard to the Skull: Therefore from every point of the *Cortex* ſaith *Vieuſſens*, when any medullary Subſtance puſheth out, that in the beginning of its Riſe will be very ſmall, but being joyn'd to other the like Parts, by degrees it grows bigger; and at length, ſenſibly riſing out, it forms the Marrow of the Brain, the *Corpus Calloſum*,

ſum, the *Crura* of the oblongated Marrow, the *Thalami*, or Chambers of the optick Nerves, and agreeable to *Willis*'s Syſtem, the oblougated *Medulla* and its *Crura*, with the *Fungus* or Swellings, as well as the *Medulla* of the *Cerebellum*, and its Productions into the oblongated *Medulla* of the *Brain*; which receiving theſe into *Ridley*'s Pyramidal and Olive like, Bodies is ſtretch'd out into the ſpinal Marrow: But from this Medullary Subſtance, as well within the *Cranium* according to *Willis*, as within the Sheath form'd within the *Vertebræ*, all the Nerves derive their Origins.

But ſince theſe firſt ſeparated Filaments or Threds appear diſtinct from each other, yet when they are united, they ſeem to make one compact Body; it is plain we ought to conſider theſe Things. Firſt, Their Riſe, Elements and Progreſs, while ſingle: 2ly, The cruder or boil'd Brains of Fiſhes, Hares, Sheep and Oxen, in which the manifeſt cylindrical Fibrils appear weigh'd down after the Form of Teeth, naturally join'd into each other. 3ly, The fine ſmall ſanguineous Veſſels plac'd amongſt thoſe Fibrils, make a plain Diviſion. 4ly, The *Cortex* poſited betwixt the ambient *Medulla*, in the very middle of the ſpinal Marrow. 5ly, The white Fibres diſpers'd thro' the middle of the proſtrated *Cortex*, in the back Part of the ſpinal Marrow, as yet latent within the *Cranium*, and to the Sides of its beginning, yet being in the *Cranium*, beſt of all in the *Appendixes* of the callous Body, and in the *Cerebellum* it ſelf. 6ly, The Collection and Diſtribution of the Medullary Fibres into the oblongated *Medulla* and from that into the Nerves.

Such a Courſe or Progreſs of theſe Fibres is plainly diſcern'd: Firſt, From every Part ſaith *Vieuſſens* of the cortical Sphere ſurrounding the Brain, theſe diſtinct Fibrils making as it were the Center of the Sphere; ſo that in the firſt place they form the

Medulla, but afterwards reflex from that, they are brought together, on the upper Part, into a callous Body and an Arch, but below, into the anterior and poſterior *Crura* of the oblongated *Medulla*, and into *Willis*'s annular Bunch or *Fungus*. 2ly, Riſing and collected after the ſame manner from the *Cerebellum*, they are committed to the preceding ones gather'd together; but ſo, that they joyn by theſe three different ways. 3ly, Hence all being united from either Origin or Beginning into one Bundle, they form one ſpinal Marrow according to *Vieuſſens*. 4ly, *Malpighius* ſaith, that from the *Cortex* within that, ariſe the like Fibrils on every ſide, and from every point thereof they joyn themſelves to the Superficies of the *Medullary Cava*, are united with that, and give a new Increaſe thereto.

Therefore ſince this Fabrick or Structure is thus conſtituted, there is an evident Reaſon for the Subſtance, Figure and Poſition of the *Cortex* of the Brain; and it is plain ſuch like cou'd not conveniently have been, unleſs there had been *Cavities* and *Ventricles*, from whence the Neceſſity of 'em appears, whilſt they are of uſe together, that a mutual Impediment is removed in every Part of the *Cerebrum*, and ſo Liberty given to the whole Marrow; from whence alſo the Riſe of the Swellings or Bunches is diſcover'd, which are found in various Places in the Brain, while there are freſh Supplies of Medullary Fibres that happen in different Parts.

But it is ſcarce credible that the *Medullary Fibres* of the *Cerebellum*, from the inferior Place of their Connexion, ſhould aſcend backwards towards the Fore Part of the *Medulla oblongata*, and from the Nerves there ariſing out of the *Medulla* of the Brain, give likewiſe ſome that ſpring from the *Cerebellum*, always preſerving an accurate Diſtinction of its Origin, Progreſs and Function: For it is manifeſt in contemplating, according to *Vieuſſens*, the various

Inſertions of the *Medulla* of the *Cerebellum*, into the *Medulla oblongata* of the *Cerebrum*, and from thence the growing or riſing Subſtance thereof; as alſo from the Conſideration of *Willis*'s ſpinal Nerve, out of the very Sheath of the *Vertebræ* going backwards into the *Cranium*, that it may join it ſelf there to the Nerve of the eighth Pair. But the reſt of the Fibres of the *Cerebellum* are ſo mix'd with the Fibres of the Brain, that there is ſcarce any Part of the whole *Medulla oblongata* and ſpinal Marrow, where the Fibres as well of the *Cerebrum* as the *Cerebellum* are not found mix'd together, and therefore enter the Compoſition of the Body of every Nerve, always and in every Place concurring in different and diſtinct Effects.

Whoever contemplates, 1ſt, the explicite Nature of the *Cortex*, and from thence, the diſtinct medullary Fibres ariſe: 2ly, Alſo the Reſemblance of this Operation with every other Part of the whole Body. 3ly, The vaſt Supply of fine, pure, moveable, arterial Blood, not deprived of the ſubtil Part, but driven thus far by the great force of the neighbouring Heart. 4ly, The ſubtil Liquor or Juice open'd betwixt the Medullary Subſtance, every where to be diſcover'd by the Taſte or Sight, and firſt of all found out by the *Microſcope*, which is oftentimes much augmented in Diſaffections of the *Cerebrum*. 5ly, The Veins from the *Pia Mater*, the *Cortex* of the *Cerebrum* and *Cerebellum*, returning the Blood back again into the *venous Sinuſſes* by the Veins from the Heart. 6ly, The aſſiduous regular Proportions of theſe very *Stamina*, from the firſt point of Life to the laſt Period, their increaſe Nutriment, ſpreading Shoots and Reductions; he muſt judge theſe ſlender little Canals to be pervious, which receive into them an Humor or Fluid which is indeed the ſubtileſt or moſt refined of the whole Body, prepared by the wonderful Structure of the *Cortex*, ſecreted, and driven by force into theſe Pipes, from every Part thereof collected into the *Medulla oblongata.*

For if he will again weigh or conſider: Firſt, the Nature or Diſpoſition of that Blood, which is call'd hither by the *carotid* and *vertebral Arteries*, and its Difference from the whole reſiduary Maſs of Blood. 2ly, Its ſubtil or fine Structure vaniſhing as it were into a fleecy Vapour, and flowing of its own gentle accord, thro' the ſmall *Arteries* ariſing from the Carotids and Vertebrals, compoſing by their inſcrutable Foldings and Continuations, the Texture of the *Cortex.* 3ly, The particular Nature of this Humour, which being contain'd in theſe Canals, can be readily exhal'd of its own Nature, and will not harden at the Fire, but will be preſently found evaporated into Air, while the reſt of the Humours of the Body grow thick before the Fire; or are us'd to leave much *Fæces* or Dregs behind. 4ly, The Strength and Celerity, which its Effects being daily obſerv'd teach us, is in the Nerves and Muſcles: He may eaſily believe that the Parts which compoſe this Liquid, are the moſt ſolid, fine, moveable, ſimple and fluideſt of all the Humours of our Body.

For while it is beheld with *Microſcopes*, as *Leewenhoeck* hath every where ſhewn, the red Part of the Blood is the thickeſt of all the Maſs of ſalubrious Humours; at the ſame time the *Serum* whoſe Parts are much finer or thinner, can be divided into Corpuſcles of an incredible Fineneſs as it appears, according to *Malpighius* in an incubated Egg when the *Fœtus* quickens, where the Humour of the white of the Egg is ſo ſucceſſively attenuated, till it is made fit to flow thro' all the ſmall Veſſels of the *Embrio*, beyond Imagination: And in Inſects the Veſſels that are infinitely fine and various, are penetrated by their Humours, which are yet obſerved to be much ſmaller in the human *Semen*, according to *Leeuwenhoeck*, from whom it will appear that the finer Parts of that Fluid ſeem to be much leſs than they were commonly thought or imagin'd to be.

And we may truly aſſert this Humour to be of a quite different Nature, from that which is compos'd of any Sorts of Salts, that are to be demonſtrated by the utmoſt force of Art; becauſe all its Properties how great ſoever retire hither, much leſs can the Oils hitherto known enter into the Compoſition thereof, ſince they are Enemies to the Paſſages of theſe Fibres. Neither is it like to Spirits produced from a vegetative fermenting matter; becauſe theſe if they are ſimple or without Mixture, they render their Fibres dry, and unable to perform their Functions; wherefore thoſe have an Analogy to the moſt ſubtil Water perhaps that of a Spirit, as having the greateſt Reſemblance thereto, in Mixture, Moveableneſs, Solidity, Softneſs, Simplicity, void of Elaſticity; yet the Mutation or Change of Liquor in an incubated Egg teaches us, thoſe Things are produced from other matter.

Again, we are convinc'd that there is a great Quantity of this Humour, in every moment of Life, that is free from *Diſeaſes* renew'd, or made freſh again; notwithſtanding the Size of the *Carotids* and the *Vertebrals*; the ſtrait Road or Courſe they take, which is free from all Hindrance or Obſtruction, the great Plenty of Blood puls'd, the larger Motion by which it is puſh'd on, and the Magnitude of the cortical Compoſition which evidently ſhow it.

And becauſe the *Apparatus* of the whole Head-piece, is furniſh'd with an oſſeous or long covering; it is not compreſſed with any ambient Fat, or any other Body, whether Muſcular or the like; but the *Arteries* themſelves, and the *Sinuſſes* run always in a direct, ſecure, Road.

In the mean while, the *Medulla oblongata* and the ſpinal Marrow being compos'd of a Collection of medullary Fibres, emit or ſend forth from within the *Cranium* as *Willis* ſaith, in Twenty different places, Ten Pair of Nerves falſely ſo call'd.; many of which being indeed compos'd of ſeveral diſtinct and large Nerves. But *Vieuſſens* affirms, that out of the ſpinal Marrow, there iſſues from without the *Cranium*, after the ſame manner Thirty Pair of Nerves; and one Pair out of the Sheath of the *Vertebræ* of the Neck, about the fourth Pair of Vertebral Nerves, which increaſing by degrees as it riſes in Branches and Thickneſs, is joyn'd to the eighth Pair.

All theſe Nerves, while they are hid within the *Medulla* are pulpy, from their very Riſe out of the *Medulla*, they derive a Sheath from the Membrane call'd *Pia Mater*, defended with which they proceed to the *Dura Mater*, which is bored through, tranſmitting the Nerves into open Sheaths, ſtretch'd out even to the very *Foramina* of the *Cranium*, and there with this Sheath taken to it ſelf, they paſs thro' the new firſt *Pairs*, and the acceſſory *Pair*, with a wonderful and ſafe Courſe out of the *Cranium*; but the other Thirty and One Pair ariſing by the artificial Spaces, amongſt the junctures of the *Apophyſes* of the *Vertebræ*, grow broader as they deſcend downwards: From whence iſſuing out ſhortly after, as *Ruyſch* ſays, firmer, harder and better fenced, or cover'd, they are diſpers'd thro' all the ſmalleſt Parts of the Solids, as already obſerved.

But the Coverings of thoſe Nerves, according to the laſt named Author, are every where ſupply'd or furniſh'd with ſanguiferous, lymphatick and other Veſſels by a cloſe Texture, from whence they are neceſſary, not from the Nerve alone as ſuch, but from the Collection thereof and Fibrils, to ſhow an intelligible *Phænomenon* of many Diſeaſes in the Nerves.

But where the laſt Ends of the Nerves entering the Parts to which they belong, depoſite again the Coats or Tunicles they firſt acquired or receiv'd, a little after they are expanded either into a fine thin kind of Membrane, or elſe into a ſoft Pulp.

Whoever conſiders diligently: Firſt, That the *Medulla* or the whole vaſculous Marrow is beſtow'd or conſumed in forming the Fibrils of the Nerves, nay, that it is ſpent upon 'em, by a ſingle continued Extenſion. 2ly, That from a Compreſſion, Deciſion, Putrefaction or Waſte of the *Medulla* of the *Cerebrum* or *Cerebellum*, every Action accuſtomed to be done by the Nerves, ariſing from thence preſently ceaſes, although the Nerves remain whole, and the Membranes are untouch'd. 3ly, That the Nerves themſelves every where being lax, hanging, crooked, going backward or oblique, yet readily perform their Office of Motion and Senſe. 4ly, That being compreſs'd or bound, tho' whole and perfect, the Nerves loſe their whole Power of Motion and Senſation in thoſe Parts, which is betwixt the Ligature and the extream Parts, to which thoſe Nerves are ſtretched; but they maintain their Faculty or Strength betwixt the Place of the Ligature and the *Medulla* of the *Cerebrum* and *Cerebellum*; he will certainly conclude, that the nerveous Fibrils conſtantly receive an Humour from the *Medulla*, and tranſmit it to every Part of the whole Body, by diſtinct Paſſages, and that this is the Method only, by which every Function is duly perform'd.

Neither is there any other way whereby to eſtabliſh an Opinion, unleſs we aſſert, that the Nerves perform every Action by Vibration, depending on a tenſe Fibril Pulſation, which is repugnant to the Nature of a ſoft pulpy flaccid Nerve, and eſpecially to that accurate Diſtinction, whereby the Objects of the Senſes are repreſented, and the Muſcular Motions tranſacted.

Therefore as the Arterial Blood and *Lympha* is perpetually moved or driven into all Parts of the Body, made up of ſuch Veſſels; ſo we underſtand in every moment of Life, that there is an Humour propell'd from the *Cerebrum* and *Cerebellum*, by the force of the Heart and Arteries, thro' the Nerves, into every point of the Solids, and that this Humour is prepared from the cortical *Cerebrum* and *Cerebellum*.

At length the Tenuity or Firmneſs of *Ruyſch's* vaſculous *Fleece* in the *Cortex*, which as yet is only Arterial at firſt, and therefore incredibly thicker in the laſt lateral Emiſſary deriving it ſelf thence, teaches us how ſlender thoſe nervous hollow *Stamina* are; but the great Subſtance of the Brain compar'd with this Smallneſs of every Fibril, demonſtrates the Number of them to lie much beyond the Limits of Imagination: Again, the great perpetual violent Action, makes a Plenty of Humours be driven hither, ſo that there is a conſtant Fullneſs, Aperture and Action of thoſe little Canals.

Yet in the mean while we are perſwaded, that the Motion of this Liquid thro' theſe Veſſels wants a great deal of force; although the Number of the Arteries, their Smallneſs, Crookedneſs and Texture, as well as the Number, Fineneſs and Winding of the Nerves, their various Hardneſs in different Places prove the Motion equal and conſtant, yet the Flux thereof is ſmall.

Therefore whether it appears wonderful to you, that the Eye cannot trace the Preſence or Motion of this Humour. That Ligatures, Wounds, Punctures, Sucktions, Injections, are not ſufficient to ſhow it? That the Cavities of the Nerves are not by any Art demonſtrable? Certainly he that reflects upon this ſeriouſly or trys to diſcover it, knows not the Nature of thoſe Veſſels and their Liquor. But he that truſts to his Eyes, following Art, and conſequently derives the Cavities of Veſſels he cannot diſcern, he certainly knows not the Nature and Reaſon of the human Body in its Origin, Progreſs, Operations and Excretions; he underſtands not the Fabrick or Structure of Inſects; obſerves not laſtly, thoſe Things which evidently happen to Plants.

But the Error would be greater ſtill, to acknowledge the thick *Lympha* that flows from the Nerves cut in the Tail of an Ox or Cow, for that Humour we have now deſcrib'd, neither does a Liquor injected into the *Carotid* of a live Animal, tinging the Nerves, ſhow that they are hollow; nor is a Tumour or Swelling that riſes upon binding the Nerves of a young Man, a ſufficient Argument to prove the Enquiry; for that Humour from its Simplicity, Subtilty, Moveableneſs, perfect Volatility, is call'd the Spirit of the Nerves, and is Vital or Animal; of which hereafter.

But ſince it is every moment renew'd, and therefore the latter puſhes on the former, its Function is ſhown from its laſt Office, to be driven from the utmoſt or extremeſt Filaments of the ſmalleſt lymphatick Veins, as well about the Glands as elſewhere, from thence to the much larger Lymphaticks; and again from theſe to the common lymphatick Veſſels, which are Veins furniſh'd with Valves; laſtly, into the Veins themſelves and into the Heart; and ſo to perform a perpetual Courſe or Circuit, like the reſt of the Humours thro' the Veſſels.

But whether it ſeems more probable, that this Humour ſhould be ſtopt laſt of all, in the ſecret Paſſages? Or rather to believe that it flows back again into the firſt, from whence firſt of all it took its Riſe? Or laſtly, do we think it exhales from the Body? Indeed theſe are not very likely.

At laſt the Blood of the *Cerebrum* and *Cerebellum* being deprived of the ſecreted Spirits, is driven into the Veins of them both according to *Vieuſſens*, from theſe ſaith *Ridley* into the *Sinus* or great venous Receptacles, from whence without an Artery attending, thro' the *Foramina* of the *Cranium* into venous Bags or Pouches, from thence back again into the internal *Jugulars*, *Subclavians*, *Cava* and the *Heart*.

In the interim, this *Lympha*, as it is every where, being ſecreted from the Arterial Blood, in every Part of the *Cerebrum* and *Cerebellum*, like all that which hath been conſtantly pour'd into the *Ventricles*, returns here ſaith *Ridley* into the lymphatick Veſſels, the *Infundibulum*, the Pituitous Gland, the jugular Veins and Heart; ſo that there is a perpetual Circulation made of it thro' the Brain.

All which being underſtood, will furniſh us with Anſwers to the following Queſtions: Why the *Cerebrum* and *Cerebellum* with their Appendixes are ſupply'd or fenc'd with a bony Caſe or Scabbard, and what is the Benefit thereof? Why is there a Vertebral Caſe or Sheath given to all the *Medulla Spinalis*? Why are Muſcles, Glands and Fat wanting here? Why do not the *Carotid* and *Vertebral Arteries* accompany their Veins, but are convey'd by a diſtinct Courſe, by other Holes diſtinct from them? Why is the Blood evacuated within the *Cranium* into *Sinuſſes* poſited at certain Places, and why does it not go out again directly? Why do the Veins empty themſelves by oppoſite ways into the *Sinus*? Why is the Figure of the *Cerebrum* ſpherical? From whence and of what Uſe are the Ventricles? What does the *Plexus Choroides* make? What Uſe or Benefit do we enjoy from the *Salciformes*, and another Proceſs of the *Dura Mater*? Why does the *Cerebellum* want *Ventricles*, is placed ſeparate, and is ſafer covered than the *Cerebrum*? Why are not the ſoft Nerves that iſſue from the Subſtance of the *Cerebrum* and *Cerebellum* compreſs'd, but have a free *Exit*? Whether the Origin and End of all the Nerves terminate in the Pineal Gland.

If we have regard to all theſe Things, it is manifeſt we ought to adore that Wiſdom that hath ſo form'd the Veſſels here, that there may be an equal and not obſtructed circulatory Motion of the ſecreted Humours: So that a perpetual Heat may be encourag'd, equally as well from the Arterial as Venal Blood, which otherwiſe would be wanting in the ſmalleſt Veſſels: Laſtly, That the returning *Lympha* may be commodiouſly convey'd and mixed with the Venous Blood, in whatſoever Situation the Head is placed.

The Blood afterwards returning from the Brain, endowed with its Energy, diluted with the cerebrous *Lympha*, mixed with new *Chyle*, *Lympha* and *Bile*, pour'd in together with Spirits perhaps and venous Blood into the Veins, received by the Heart, puls'd thence into the Lungs, and chang'd farther by them, reaſſumes again that Nature or Diſpoſition which it had before it reach'd the *Cerebrum*.

For if nothing that is crude will ſtick thereto, certainly it is moſt aptly fitted for every new *Apparatus*, which will ſupply new Spirits again from the Aſſiſtance of the Texture of the *Cerebrum* and *Cerebellum*.

Wherefore alſo it is probable, that a certain Portion of the whole Maſs of Blood may ſo go and return this way, that is, ſhall ſcarcely be mix'd with Blood of another Nature, but here undergo a frequent, ſwift and more equal Circulation.

Laſtly, If we contemplate the vaſt Size or Subſtance of the *Cerebrum* and *Cerebellum*, the *Medulla oblongata*, *Medulla ſpinalis*, and make a compariſon with that to the reſt of the Solids of the Body; the great Number of Nerves iſſuing there from, and diſtributed every where throughout the Body; the *Cerebrum* and ſpinal Marrow are the *Baſis* of the *Embrio*, from whence the remaining *Viſcera* and other Parts are afterwards generated, as the famous *Malpighius*

pighius witneſſeth: There is ſcarce any Particle of the Body, which is not ſenſible, or that moves not it ſelf: We may eaſily believe all the ſolid Parts of the Body are made of nervous Fibres, and conſiſt of them.

It will not alſo be abſurd to ſuppoſe, that the ſmalleſt Veſſels in the whole Body ariſing from an Artery in the Extremity, comes to be like the ſmalleſt Fibril of a *Nerve*, as to Size, yet containing an Humour therein, and other Properties.

That Part or Portion of the Blood which reaches the Head, but being carried by lateral Arteries, is not beſtowed in elaborating the Spirits, but is brought ſaith *Ridley* to the *Dura Mater*, the *Cranium*, the *Pericranium*, the Muſcles and other Parts incumbent on the *Cranium*.

The *Dura Mater* is the *Baſis* of the internal *Perioſteum* of the *Cranium*, in which theſe appointed *Arteries* ſend forth ſmall Branches to the very Bones of the *Cranium*, which propagate the minuteſt Veſſels every where, but thoſe are diſtributed amongſt the fine, thin, oſſeous Plates, which running in with others conſtitute thoſe ſubtil Unions, to which Nutrition, Heat, Secretion of Marrow, according to the occaſion of the Increaſe or Decreaſe of the *Cranium* is brought about.

Hence the Blood, which from its Solidity, Thinneſs, Mobility and Fluidity, next equals that which is beſtow'd on or given to the Head, is driven into the Subclavians, Axillaries, Brachial Arteries and thoſe of the Hands; where likewiſe it performs its Actions by the minuteſt Veſſels, as in thoſe Parts there is the greateſt Agility, Motion, Strength, Heat, Sweat, and from the ſame Cauſes the ſwifteſt Circulation.

But as it is in other Places ſo likewiſe here, the brought Blood ſecreted and diſtributed thro' the ſmalleſt Veſſels is carryed into the Bones, the Marrow, Membranes, Muſcles, Fat, Glands and Skin, where the Veſſels diſappearing by reaſon of their extream Fineneſs, there is a Return made by other Veſſels, ſenſibly or by degrees increaſing larger, and the Humours are brought again into the Veins of the *Hand*, *Arm*, *Shoulder*, *Axillary*, *Cava* and Heart.

For we muſt underſtand that at the End of every little Artery, there is placed a little Machine, as it were of a glandulous Structure, from which ſprings a Veſſel that carries the Humour off, which is ſecreted there, and which is various, being lymphatick, ſerous, oily, and which alſo being brought back again in its Veſſels, pour'd into the Blood and mixed therewith, returns by the Veins with the reſt of the Blood into the Heart. Every *Dropſy*, eſpecially an *Anaſarca*, hath a lymphatick Humour riſing in the Parts, the Veins of which being bound; you may diſcover *Fiſtulous Ulcers*, *Hydatides*, *Phlyctenæ*, frequently lodged in the Fat.

From whence that Part of the Blood, whoſe ſtronger Texture renders it more immoveable and thicker, is carried according to the Hydraulick Laws, as *Caſſerius* ſays, into the deſcending Trunk of the *Aorta*; the finer Part of which ſaith the ſame Author, enters the *Intercoſtal Arteries*, which performing its Office, and paſſing with a quick Circulation after the former, disburthens it ſelf ſaith *Barthol: Euſtachius* into the *Vena ſine pari*, ſo into the *Cava*, and returns into the *Heart*, by which wonderful *Apparatus* it is brought about, that there is ſuch a free Circumduction or Circulation of Blood, that is no ways impeded by the Quantity of Blood in the *Vena Cava*; while the Parts exonerating themſelves into that Vein, to wit, the Intercoſtal Parts, and great Part of the Membranes ſeated in the Breaſt, ſeldom bring any Hindrance or Impediment without great and evident Danger of Life, for which Reaſon ſaith *Ruyſch*, there is a free Courſe from the *Arteries* into the Veins: Whereby is underſtood the Reaſon of its Celerity in theſe Paſſages, as alſo the Frequency of the moſt acute Diſeaſes happening ſo often here.

From thence *Caſſerius* ſays, the *Phrenick Arteries* and *Pericardia-Diaphragmaticks*, receiving the Blood equally, or alike, from the Intercoſtal and Vertebral Artery, and here by an abſolute Courſe, diſcharging themſelves into the *Phrenick* Veins, from thence into the *Cava*, likewiſe make way for a free and rapid Circulation of the Humours.

A little after the deſcending *Aorta*, after paſſing by the *Septum tranſverſum*, viſits the Loins, the *Abdomen*, the Thighs, the Legs and Feet; from whence the Blood returns by the Veins furniſh'd with Valves about the Inferior Parts: But from this ſame Trunk, here the Arterial Branches are propagated from under the *Diaphragm*, to all the *Viſcera* of the *Abdomen*, which may be commodiouſly divided into ſuch as contribute towards the *Chyle*, the *Urine*, and the *Sperm*, and which perform their Actions by a glandulous Structure.

The Action of the Spleen.

THE Place or Situation of the *Spleen* ſaith *Veſalius*, and its Nearneſs to the *Cæliack Artery*, as well as its Office for that Bowel, together with the Motion of the Humours thereof, requires that we ſhould treat of that firſt. It is ſeated in the left *Hypocondrium*, hanging under the *Diaphragm*, adhering to the left *Kidney*, the *Caul*, and here as if it were the *Ventricle*, it eaſily receives the Variety of Preſſure, and perpetual Agitations upwards and downwards, from the Motion of the *Septum tranſverſum*, and the *Abdominal Muſcles*.

This Bowel receives pure *Arterial Blood*, immediately after it is expuls'd from the Heart, by the firſt notable *Artery*, ariſing from under the *Septum*, to wit the *Cæliack*, while the firſt Branch thereof, ſaith *Lower*, gives to this a Shoot or Sprig, and the third Branch often beſtows upon it three Trunks, or ſome that is granted from the *Aorta* it ſelf, for this Reaſon, that the *Liver*, the *Pancreas*, *Duodenum* and Stomach may receive theirs from the ſame Veſſel; that the Blood ſo ſupply'd may be like to that which is beſtowed upon the ſaid Parts.

Theſe *Arteries* according to *Drelincourt* are pretty large, and exceed thoſe of the Liver by an incredible Size, the Body of which ſaith *Ruyſch*, at its Entrance in preſently diſtributed thro' the whole Subſtance, is divided into innumerable many Branches, the Ends of which paſs into ſmall Canals that are join'd together, and ſo collected that they ſeem to conſtitute little Glands and ſo diſappear, every where about the Extremities of the *Splenick Vein*.

Comparative Anatomy in Men, Oxen, Sheep, Moles *&c.* the morbid State in a dead Body, with putrified Tubercles ſwimming in the *Spleen*, the looking on a macerated or bruiſed *Spleen*, teach us, it is not improbable that thoſe *Arteries* may degenerate into a glandulous Structure.

Yet wh n the Artificial Impletion of the Veſſels according to *Ruyſch*, ſhows us a direct Paſſage from theſe *Arteries* into the Veins; all the Ends or Extremities of the *Splenetick Arteries* do not appear for that Reaſon to be terminated, but to obtain here a variety ſufficiently remarkable; which yet no Art can diſtinctly produce to the Eye, eſpecially by reaſon of the extream Brittleneſs of that tender Bowel.

Yet it appears plain, that that is the Structure of the Parts here, which is preſent every where throughout the Body, where Secretion is perform'd; and therefore that is certainly done in this Place.

Yet here is no common Emunctory, ſaith *Drelincourt*, producible from the *Spleen*, and the Lymphaticks found there inveſting the entire Membrane, run only betwixt the Two Splenick Membranes; and alſo penetrating the interior Parts, they ariſe not from theſe Extremities of the *Arteries*, but from thoſe Veſſels which ſerve for the Nutrition of the Splenick Body.

Therefore ſince comparative Anatomy teaches, that in moſt Brutes the ſame Structure is to be found, ſaith *Malpighius*, which perhaps in Man is not unlike, tho' by Reaſon of the great Laxneſs of the Part, it cannot be demonſtrated to the Eye; but it hath a near Reſemblance; the Splenick Vein is very large as it enters the *Spleen*, ſtretching its Branches every where about, thro' its whole Maſs; it hath *Foramina* conſpicuous enough, from thence being further diſtributed, it ſeems almoſt out of Sight, at the Ends of the little *Arteries*, where thoſe and the Nerves are together; whence it is plain that from the Extremities of thoſe Veſſels, and alſo by the *Foramina* which are ſufficiently large, this Vein is fill'd; and therefore the Blood is not drawn back by the Extremities of the Venous Mouths, from that glandulous Structure; but by thoſe larger Orifices which open into the Venous *Sinus*, and receive that Humour which can be evacuated thence out of the adjacent Receptacles.

For if the Splenick *Artery* be inflated with Air, and then the Vein be ſtrictly tyed, that is, diſtributed thro' its whole permeable Body, and afterwards the *Artery*, the Spleen being cut off and dry'd in the Air, there will appear beſides *Arteries*, Veins and Nerves, many empty, diſtended and diſtinct Cells, made up of erected Membranes of a different Figure and Size, which lye open mutually amongſt themſelves with a gaping Orifice, and alſo are imprinted or drawn into thoſe greater *Foramina* from the venous *Sinus.*

The Sides of the Membranes which conſtitute the ſaid *Cells*, are water'd by the minuteſt *Arteries*, likewiſe the ſmall, white, ſoft, innumerable Corpuſcles of an oval Figure, diſpos'd in the Membranes forming thoſe Cells, are like a Cluſter of Grapes. which preſs or ſqueez the Glands at every ſenſible Function.

In the mean while, ſaith *Willis*, there are many large different Nerves, ſtretch'd thro' the *Spleen* ſingly, and every where diſtributed thro' the ſame, when at the ſame time there ſcarce appears to be a ſenſible Motion exercis'd or perform'd in that *Viſcera*, neither does there ſeem to be any Senſe therein, or is it obſerv'd to have been required in it: Wherefore it is ſcarce credible, that thoſe little Canals ſhou'd bring hither their ſubtil Fluid, and alſo mix it with other venous Liquors brought here.

From hence the firſt Action of the *Spleen* appears to be, that the *Arterial* Blood rich in *Lympha* and perfect, prepares in the ſmalleſt Glands a more ſubtil *Lympha*, which it ſecerns by its particular Emunctories, and pours out into the Cells; which is alſo partly ſent into the *ſplenick Vein.* 2ly, The remaining Blood after this Action is return'd by the minute Veins; hence it ſeems to be caſt into the common *ſplenick Vein.* 3ly, The other Number of little *Arteries*, which inveſts the Sides of the Cells, pours in an attenuated or thin Maſs of Blood from their *Arterial* Structure, loaded or full of *Lympha*, opening into the Cavities of the Cells, as is obſerved to happen in the Cells of the virile Yard. 4ly, From thence that copious Spirit of the Nerves is ſuppos'd to be carried, depoſited, mix'd and daily ſupply'd. 5ly, All thoſe Humours thus prepared, confounded or mix'd together, ſtagnating for a time, by the *Arterial* Force of the Blood, the *Impetus* of the nervous Juice, the Contraction of the two proper Membranes and the *Vagina*, the Conſtriction of the Fibres ſo numerous here, the Agitation of the *Septum tranſverſum*, the Muſcles, Veſſels and *Viſcera* of the *Abdomen*, are compreſs'd, mixed, attenuated, and undergo the ſame Operations as the Blood does in paſſing thro' the *Lungs*.

For which Reaſons, this Fluid, free Blood, being full of Spirits and abounding with *Lympha*, is difficult to concrete, being intimately mixed, not eaſily dividing into Heterogeneous Parts, but is made of a purple red Colour, and ſuch as is ſent forth from this Bowel by the great *ſplenick Vein.*

This therefore is the Effect or Action of the *Spleen*; and conſequently it hath no *Emiſſary* as the other *Viſcera* have, by which it emits a particular Humour made from its own Structure, but produces all mixed together.

Indeed it appears moſt evident, that all the Fruit of this Action ariſes in the *Spleen*, but is of no Service thereto; but ſince every Humour thus made paſſes into one of the Veins of the *Porta* and *Liver*; it is plain the Uſe of the *Spleen* is to aſſiſt the *Liver*, and therefore cannot be conveniently explain'd, except firſt we examine into the Effects and Functions of the *Liver.*

But there are many things otherwiſe obſcure enough to be underſtood from the Doctrine laid down, and from thence may be confirm'd or proved, as for example.

What does the Situation, Subſtance, Neighbourhood and Suſpenſion of the *Spleen* ſignify?

What do we learn from the Poſition, Origin and Size of the *Splenick Artery*?

Why the Animal, when the *Spleen* is taken away, remains ſalacious alone, and how long? The Situation of the *Spermatick Artery* learns us that.

Why a frequent Inclination to make Water follows the cutting out of the *Spleen* ? The *Renal Artery* informs us.

Whence proceeds the great Voraciousneſs to an Animal after the Loſs of the *Spleen* ? The Situation of the *Cæliack Artery* indicates that.

What is the Reaſon in the firſt Days of Vomiting and Nauſeouſneſs after the Extirpation of a *Borborygmus* ? The ſame as the former, together with the Poſition of the Nerves of the Stomach and *Spleen.*

Why is there a Swelling of the Right *Hypocondria*, and an Encreaſe of the *Liver*, after the Loſs of the *Spleen* ?

What is the reaſon that ſplenetick and Hypochondriack Patients are ſo ſubject to be of a pale or wan Complexion ?

What can be the Cauſe why they are ſo prone to Laughter ?

Therefore whether the Spleen be made for a Ballance of Weight on that ſide, or for Symmetry and Proportion ? or whether it is an uſeleſs *Pondus* ? or the Error of ſleeping Nature ? or the Sink and Channel purging melancholy Dregs from the Blood ? or it is the Operator and *Focus* of the vital Spirit, by the radiant Heat of which the Action of the Stomach is animated and encourag'd ? or this be the Seat of Luxury, the kind Author of Fecundity, or the niggard Step-mother of Barrenneſs ? whether here lies hid the ſoft Promoter and Nouriſher of pleaſing Dreams ? or it may be rightly term'd the antient Parent of Laughter, Mirth, Joy and the *Saturnian* Age ? undoubtedly all theſe things are clear'd up, by the evident Diſcoveries of the accurate *Malpighius* ; nor is it made more probable to ſupport the Nerves dilated hither, and made to diſtribute the Spirits thro' its whole Region ; neither can it give leſs than univerſal Perfection to all the Blood.

Thi

The Action of the Omentum or Caul.

BUT while that Blood is prepared from every Part of the *Spleen*, ſaith *Veſalius*, thro' ſeveral venous Ducts, it is at length poured into the great *Splenick* Vein, as from its Duct it is thrown into the *Vena Porta*, and from thence into the *Liver*; in all this Courſe the venous Blood from the *Caul*, is mix'd with it by its own proper Veſſel, agreeable to the ſettled Law of Nature.

The Connexion, Situation, Structure and Inſertion of the *Caul*, conſider'd by the illuſtrious *Malpighius*, and conferred together with thoſe which that induſtrious Anatomiſt hath detected in the different Bodies of Brutes; teacheth us the ſame from the omentous *Arteries*, diſtributed about the little Bags or Cells of Fat, into fine reticular or Net-work Unions, and there ending in Veins placed in like manner there, which by the Help of lateral *Emiſſaries* betwixt the Bags of Fat, ſecern or ſeparate a thin ſubtil Oil from the Blood, which they there collect and keep; ſo that at laſt from theſe Bags united together, and opening into certain Ducts, this collected Oil is expell'd, and ſo may be conveyed forward to the *Liver*, and by the ſame reaſon pour'd in, and mix'd with the *ſplenick* Blood.

It likewiſe appears probable from the Apertures of the minuteſt Veſſels, lying open every where in the Superficies of the *Caul*, that there is inſinuated into them a fine Vapour, that ariſes conſtantly in the warm Belly, from a ſubtil Dew dropping there, thro' the ſmall Mouths of the exhaling Veſſels; whereby they are always found and obſerved to be hot, and to moiſten the Superficies of all the Bodies, adhering to or within the *Peritonæum*. But it is neceſſary, that this ſubtil and ſomewhat volatile Humour ſhou'd be allowed; for we are made ſenſible thereof from its Riſe, Nature and Odour, that diffuſes or ſpreads it ſelf upon the opening of the *Abdomen*, beſides the perpetual Conſumption and Refection of the ſame.

Since therefore the *Caul* is not obſerved or taken notice of, to have any other excretory Veſſel in Man, beſides the Two Veins, call'd *Veſalius*'s right and left *Epiploick*, it is probable the venous Blood of the *Caul*, enrich'd with *Lympha* and Oil, pours it all out to be mix'd with the flowing Stream in the *Liver*.

From whence may be underſtood, why in Creatures at reſt, the Subſtance of the *Caul* ſhould grow to ſuch a Bulk? and why on the contrary, in Animals that uſe too much Motion, the Veſſels ſhou'd rather appear full of *Serum*, than Fat or Oil? Alſo why in emaciated and Hydropick Bodies, theſe Veſſels are almoſt always fill'd with a thin *Serum*? Laſtly, that for the Encreaſe of Motion there is required a greater quantity of collected Oil, being derived towards the *ſplenick Vein*, and at length the *Caul* adhering to the *Viſcera* that are almoſt void of any Fat.

But to the ſame Blood alſo, that venous Part is mixed, which returns from the Texture of the *Ventricle* by *Veſalius*'s *Vas breve*, the left *Gaſtro-epiploick*, the great Gaſtrick, the right *Gaſtro-epiploick*, and the *Pylorick*; which being deſtitute of that, diſtills into the Cavity of the *Ventricle*, therefore is mixed in divers Places to the returning Blood from the *Caul*; and perhaps carries with it a great deal of the ſubtil Humour, which it drew from the finer Part of the Aliment, either Eatables or Drinkables by the abſorbing Veſſels of the Stomach.

But the ſmalleſt Branches from the *Pancreas*, and the internal *Hæmorrhoidal*, from thence alſo draw their Blood, which perhaps is a little more acrid than the reſt.

Laſtly, All the Blood which was brought into the *Meſentery* and *Inteſtines*, by the Help or Aſſiſtance of the upper and lower *Meſenterick Artery*, and there exerciſed, returns into the *Meſenterick* Veins, and at length is mixed with all theſe Humours before its Entrance into the *Liver*: And this laſt wants the Conveyance of *Lympha* into the Cavity of the Inteſtines; but being again furniſhed with a thin *Bile* and ſome Part of the *Chyle*, it affords Matter that is not altogether uſeleſs for making *Bile* for the *Liver*.

Therefore the Blood, which preſently flows by the V*ena Porta* into the Liver, is fluid, ſoluble, attenuated with Spirits and *Lympha*, rich in Bile, and partly by the Help of Reſpiration acting powerfully thereon, partly likewiſe by the Force, tho' more gentle of the Blood puls'd round it, all theſe different Humours brought from different Parts, are well mixed in the great Channel, into which they run together, that they may be fitter for Transfluxion, Secretion, and thorough Paſſage into the Veins.

The Action of the Liver.

THE V*ena Porta*, ſaith V*eſalius*, form'd out of ſo many Veins paſſing here into this one Tube, elated upwards, enters the *Liver* about the middle of the hollow of the Superficies betwixt the *Tubercles* call'd *πύλας*; a little further becomes ſtrong and fibrous like the Tunicle of an *Artery*, with a Coat as a Sheath, forming a Space half an Inch broad, making a *Sinus* ſufficiently large and ample, being driven into which, it is collected and retarded there, this various Humour from the proper Motion of its Concourſe and the Action of Reſpiration, is ſubdued and mingled, ſo that being equally divided, it proceeds on its Courſe.

Preſently after it iſſues forth after the Nature of a Vein and a *Sinus*, and being, according to *Gliſſon*, diſpers'd into many Branches, and from thence into innumerable leſſer ones, it reaches almoſt every minute Point of the Hepatick Body, ſo that at laſt its Extremities eſcape our Eyes, and ſo conſtitute every Part of the whole Subſtance of the *Liver.*

Thence the Hepatick *Artery* ariſing from the right Branch of the *Cæliack Artery*, entring the *Liver* near the πύλας, it inſinuates it ſelf into the Subſtance of the *Vagina*, being diſtributed thereby, and divided even to the minuteſt Parts, it reaches all, or the ſmalleſt Places, and ſo is ſeen not only in the Tunicle, but in every Part, tho' it paſſes not thro' this thick *Vagina*, and ſo cannot penetrate the larger Veſſels. Hence others, ſaith *Ruyſch*, come from the *Diaphragm* and the ſuſpenſory Ligament, inſerting themſelves firſt of all with their Branches; laſtly, their Extremities are from the *Cyſtick Arteries.*

But the V*ena Cava*, ſaith V*eſalius*, tending upwards towards the *Diaphragm*, inſinuates it ſelf by the Gibbous or *Convex* Superficies, in the Place of its Connexion by open Paſſages into it ſelf, and diſtinct *Foramina*, receives from the *Liver* three larger Branches, and ſeveral leſſer ones; which, ſaith *Gliſſon*, being collected from innumerable ſmall ones diſpers'd thro' the whole Body of the *Liver*, at length bring back the Blood from the V*ena Porta*, 'tho', ſaith *Ruyſch*, they ſeem to be fewer in Number, and leſs in Size than the other.

Where-ever the laſt or extreme Ends of the two ſaid Veins are joyn'd together, they become ſo ſmall, that being diſpoſed into an admirable fine Bundle, like ſo many Hairs tyed together; and being thus configurated, they appear, as *Malpighius* demonſtrates, like diſtinct Globules, ariſing from cloſe inviſible Veſſels, ſeparated from the neighbouring ones;

theſe Corpuſcles are likeſt thoſe which are call'd ſimple Glands; to be the better ſatisfied in which, we muſt apply our ſelves to the Inſpection of Inſects, Fiſhes, Quadrupeds and Birds, and be convinc'd from the naked Eye.

In which very Places, there is always found a little ſmall Canal, ariſing from thoſe Kernels by an inviſible Spring following the Branches of the *Porta*, with an undivided Courſe wrapt up in the ſame *Vagina*, and ſticking to it, as *Kuyſch* affirms, ſo tenaciouſly, that it cannot be ſeparated, growing by degrees from the Concourſe of the like Pipes, ending at laſt at the Trunk of the *Vena Porta* in one Pipe, according to *Gliſſon*, which is call'd the Hepatick or Biliary Duct, whereby a various or different Fluid is aſſiduouſly received and deduced thence, call'd the Hepatick *Bile*.

The Contemplation of the Fabrick or Structure of the *Vena Porta*, the *Cava* and Hepatick Duct; the Conſideration of the Motion of the Humours work'd in the *Vena Porta*; the Nature of the Humour contain'd in the Biliary Duct; Anatomical Experiments made by binding or tying, cutting and collecting the *Bile* teach us, that from the Blood brought by the *Vena Porta*, there is a fluent Humour ſeparated in thoſe minute Places, which is afterwards thrown out of the *Liver* by the little Branches of the Hepatick Duct, while the remaining Blood by this Labour, impuls'd from the Branches of the *Vena Cava*, out of the *Liver*, flows thro' the *Vena Cava* towards the Heart.

Which thing is clearer underſtood from the Diſtribution of the Hepatick Nerve, divided always the ſame way as the *Vena Porta*.

In Men, the capacious oval Gall-bladder adheres to the hollow or concave Part of the *Liver*, ſaith *Veſalius*, paſſing out into a Cyſtick Canal or Duct, ſo that the Neck is deeper than the bottom, from whence, with the *Porus Bilarius*, it is join'd to its own Duct, by an acute Angle, making thus united together, the great common Duct obliquely deſcending, which, apply'd to the acute Angles, penetrates the exterior Coat in the *Duodenum*; from thence, deſcending betwixt that and the other, proceeding forward with this Perforation, with a long Courſe betwixt the ſecond and third, it makes a free Exit by a round *Foramen* into the Cavity of the *Inteſtine*; all which teach us, that the *Bile* cannot at all times and in every Circumſtance, be pour'd into the Guts from the *Liver*, but only when the Inteſtines are relaxed, for upon their forcible Contraction it is not to be done at all.

The Hydraulick Contemplation of this Fabrick, compared with what hath been already delivered, demonſtrates clearly, that from every point of the *Liver* and the Gall-bladder, there is an Humour brought by the common *Meatus* or Paſſage, thro' a natural Courſe or way into the *Inteſtines*, where being puls'd from the Ventricle, the *Chyle* is firſt of all lodg'd.

In the mean time, Experiments teach us, that the way is open and ready from the Cavity of the *Gall-bladder* into the *Liver*, the Biliary Duct, the *Inteſtines*, likewiſe from the Hepatick Duct by the *Liver* into the *Gall-bladder*, the Cyſtick Duct, the *Inteſtines*, and laſtly, from the Hepatick Duct into the Cyſtick, from this into that: Anatomy informs that the V*eſicula* is ſometimes wanting in Horſes, as *Needham* affirms; otherwiſe, according to *Wepfer*, the Hepatick *Meatus* pours in its Humour from the Cavity of the Bladder; ſometimes the Hepatick Bile does it viſibly from the V*eſicaria*; from whence it is very probable; firſt, That the Hepatick Bile naturally runs backwards and forwards, ſometimes into the *Bladder*, ſometimes back again into the *Liver* and V*ena Cava*, from thence it flows thro' the

Body: In the next place by ſtagnating in the *Bladder,* it acquires the Property of the Cyſtick Bile. 3ly, But perhaps the bitter Part or Portion is chiefly made in the Glands, ſeated in the Membrane of the *Bladder,* water'd by the Cyſtick *Arteries,* as in the Membrane of the Auditory *Meatus*; and then 4ly, From thence to mingle the refluent Hepatick Humour in the *Bladder* it ſelf.

Which are more confirm'd by the Diſcoveries of *Gliſſon, Verheyen* and *Perault,* from the numerous Pipes out of the *Liver* and Hepatick Duct, implanted into the *Gall-bladder,* perpetually carrying an Humour from thence.

From all which Authors, the Truth will ſhine by their Determinations of the following Poſitions: Firſt, That the Hepatick *Artery* ſerves for the Support of Life, Nutrition, Heat, Propulſion of the Hepatick Humours, the Secretion and Expulſion of the ſame. 2ly, That from its Extremities are produced the vaſt quantity of inviſible Lymphaticks, from whence come the viſible ones, which end not in the *Vena Porta,* but in the Cyſtern of the *Lumbares.* 3ly, There are Veins receiving Blood brought from the Hepatick *Artery,* that remains after this Operation, conveying that into a Portion of the *Aſygos* Vein, which is under the *Septum.* 4ly, All the *Abdominal Viſcera* are ſerviceable, or contribute to Digeſtion, the Spleen, the Caul, the Stomach, Pancreas, Meſentery, Inteſtines, being uſeful to the *Liver* only by carrying thither a venous Blood, but what is wonderfully chang'd or alter'd. 5ly, The Veins may be chang'd into Veſſels the likeſt *Arteries,* from their Structure, Size and Uſe. 6ly, The Secretions are made from the venous Blood. 7ly, The Portion of the Blood from the Heart, is made from a double arterial and a double venous Pulſe, before it returns into the Heart. 8ly, The Trajection of the Humour is ſloweſt here; and therefore, 9ly, The

Connexion and Situation of the *Liver* to the *Septum tranſverſum* is neceſſary. 10ly, The Generation of Stones, Gravel, Worms and other *Sordes*, is more eaſy in thoſe who uſe little Exerciſe about this Bowel, from whence proceeds many Diſeaſes. 11ly, The entire Office or Function of the *Spleen*, is to prepare *Bile* for the *Liver.* From whence, 12ly, there is ſuch a Dependance on one another, as well in Health as Sickneſs, and in every circumſtance of Life. 13ly, The matter or ſubſtance of the *Bile*, as Chymical *Analyſis* informs us, hath here a different Original from the reſt of the Humours. 14ly, There is here a ſingular or particular Circumduction of the Blood, the like to which is not to be diſcovered any where in the Body. 15ly, There is a certain Likeneſs betwixt the *Sinus* of the *Vena Porta* and the Heart, betwixt the Five Branches of this *Sinus*, and the *Arteries* ſpringing from the Cavities of the Heart. 16ly, There is not elſewhere to be met with a greater Difficulty in the Cure of Topical Diſeaſes. 17ly, Notwithſtanding, there is no where ſo many *Viſcera*, ſo many Veſſels, Humours and Cauſes, that concur to create any Liquor or Fluid in the Body, as do, to produce the *Bile* in this place. 18ly, Hence this muſt be the moſt uſeful, univerſal, efficacious Help or Aſſiſtant to the Change or Alteration of a foreign and exotick Humour into the nature of a familiar Inmate: therefore, 19ly, The *Bile* is not an Excrement, but in the laſt Place the *Liver* rather ſerves to promote *Digeſtion*, than *Chylification*.

The Action of the Kidneys.

SInce we have already treated of the *Pancreas*, *Meſentery*, Stomach and Inteſtines, Order requires that we ſhou'd proceed to the Action of the *Kidneys*:

Their Situation and Connexion are ſo order'd, that they may be aſſiſted in Excretion by the Motion of the neighbouring Parts, eſpecially the right *Kidney*, ſaith *Euſtachius*, being defended under the Membrane of the *Peritonæum* expanded round it, and wrapt up in a drier kind of Fat, they receive, ſaith the ſame Author, incumbent Glands; and from thence, out of the deſcending *Aorta*, a large Branch or more, from thence Four or Five larger ones, from theſe, many other leſs; and then again, the ſmalleſt crooked ones that eſcape our ſight, being diſtributed thro' all Parts of the *Kidneys*. Thoſe Branches of theſe little *Arteries*, ſaith *Ruyſch*, being united and ſeparated in their mutual Courſes, form as it were a *Clue*; but from theſe laſt, there ſeem to ariſe the minuteſt returning Veins, as well as lateral Pipes, that are very fine and almoſt pellucid, receiving and conveying the Urine ſeparated from the little *Arteries*, and where they are united, they form many pyramidal polygon Bodies, that at length end, ſay *Malpighius* and *Bellinus*, oftentimes in twelve membranous Bodies, call'd *Papillæ*, in which many collected Mouths of the renal Pipes ſtand open obliquely, every where and on every ſide as well without as within.

In the mean time, there are, according both to *Malpighius* and *Ruyſch*, ſmall, round, hollow Corpuſcles in the Subſtance of the *Kidneys*, adorn'd on every ſide with little Veſſels, made up of Veins and Nerves, almoſt touching the urinary Pipes; whence the Urine may be ſeen to be ſecern'd or ſeparated here, by a double *Apparatus*, from a glandulous Operation, and that more ſimple one of *Ruyſch*, which is not repugnant to the Practice of Nature in other Places, as for example, in the *Liver*.

But the other Part of the *Renal Artery*, is neceſſarily beſtow'd for the Support of Life and Heat, by being ſubſervient to the very ſubſtance of the

Kidney: And from the Blood of this, *Nuck* ſays, that *Lympha* ſeems to ariſe, which returning in ſuch abundance from the *Kidneys,* is reſtored by the Channel of the *Chyle,* into the great Circuit of the Blood: And without doubt all its proper Veins ſpring from hence.

For from the extreme Sprigs of the little renal *Arteries,* the ſmalleſt Veins ariſe, ſaith *Euſtachius,* which being gather'd together make greater, unite into Branches like the Diviſion of *Arteries;* at length, ſaith he, joyning again, their Trunks, are uncertain in Number, and emit by different ways into the *Vena Cava* Blood, that remains after the performing their Functions.

Beſides, the *Papillæ* of the *Kidneys,* the Fluid brought by the urinary Pipes, drop into a large Cavity, made from the expanded Membrane of the *Pelvis;* from whence the collected Mixture is driven into a Duct made by the ſtreightned *Pelvis,* call'd the *Ureter,* from whence it is carry'd afterwards to the Bladder.

For from the Circuit or Courſe of the *Papillæ* ariſe, ſaith *Euſtachius,* Eleven or Twelve membranous Canals receiving them and the Humour diſtilling there-from, which paſs into Three great Branches, that being collected into one, make a large *Pelvis;* which ends in one ſtrong membranous Pipe, made up of *Arteries,* Veins, Nerves, Lymphatick Veſſels and moving Fibres, that is call'd the *Ureter,* which running downwards, afterwards bending in, under the *Lamella* of the *Peritonæum,* it is inſerted, according to *Veſalius,* in the poſtick Part of the Bladder, ſcarce Two Fingers diſtance from the lower Neck, and perforating the external Tunicle or Coat far leſs than the ſpace of a Finger's Breadth, runs obliquely betwixt this and the internal, and makes a Penetration into the Cavity of the Bladder, where it pours in the renal Urine by a ſafe Journey, being hindred by its own Structure or Make, from riſing back from the hollow of the Bladder into the *Ureters*, howſoever it be compreſs'd or ſqueez'd.

Microſcopes, Injections, Ligatures, comparative Anatomy in Hedgehogs, Mice, teſtaceous Fiſh, Bears, Oxen, Birds, Human *Fœtus*'s, the Diſſection of Dead Bodies, ſubject to Diſeaſes of the Reins, monſtrous Kidneys, all theſe teach us this is their Condition.

From whence a mechanical Secretion of Urine is underſtood to be made by the Force of the adjacent Heart, and the Strength of the Arteries, by which the aqueous Blood is puſh'd forwards thro' innumerable Windings and Turnings, oppoſite Motions, Concuſſions, *&c.* and laſt of all, its liquider Part is ſecern'd, propell'd and ejected by much ſtraiter or narrower Pipes, than thoſe of the ſanguiferous Veſſels.

Therefore here is no feigning of Attraction, Emulſion or the like Faculties, neither will there be any need of a foreign or inteſtine Fermentation; for here is neither Place, nor Cauſe, nor Time, nor Matter, nor Mixture, nor Effect; neither ought we further, for the ſame reaſons to imagine any Virtue or Function of pouring out, or precipitating the Liquor, but that it flows naturally or of its own accord, according to the Size, Structure or Strength of the renal Veſſels.

The Action of the Urinary Bladder.

IN the *Pelvis*, beneath the over-ſtretch'd *Lamella* of the *Peritonæum*, adheres the Urinary Bladder, ſaith *Veſalius*, ſecurely defended, conſiſting of three different Membranes, to wit, of an external one

from

from the *Peritonæum*, a middle one made up of various muſcular Fibres, and an internal Membrane, ſaith *Graef*, form'd of mucous Glands, which hinders the Eroſion of the acrid Urine that may lodge thereon. Therefore when the Urine corrodes, diſtends or irritates by its Acrimony, Quantity or long Reſidence upon the Part, a troubleſome Senſe of Pain ariſes from the deters'd *Mucus*, or Slime being worn off, by which means the Motion is excited; from whence all the Abdominal Contents are driven with great Force into the Membrane extended over the *Pelvis*, hence into the Bladder, and ſince nothing reſiſts at that time, the Urine is driven beneath with great Force into the Aperture, at the Neck of the Bladder, extending it, and preſſing the Veſſels placed around it, it raiſes the orbicular Sphincter, which, according to *Fallopius*, ſticks in the upper Part of the Neck above the *Proſtata*, under the right external Fibres, with their tranſverſe carnous ones that are not very thick; from whence, by the ſame Force, *de Graef* aſſerts, the Urine is driven into the hollow Pipe of the *Urethra*; and then by the flaccid *Urethra*, from hence, out of the Body.

As ſoon as that Action ceaſes, the Fibres preſſing no further, contract themſelves by the proper Strength of the Sphincter, and ſo firmly ſhut the Bladder: So the Muſcles in Men, expreſſing and agitating the Urine, expel the Remainder thereof: For ſince theſe, ſaith *Cowper*, ariſe from the upper external Part of the *Urethra* under the *Os Pubis*, and bind or ſurround extrinſecally part of the ſame *Urethra*, united on the lower ſide, and ſo proceeding to the *Peritonæum*, and there aſcending ſeparately, are inſerted on both ſides to the *Corpora cavernoſa* of the *Penis*: This Action of thoſe is eaſily underſtood, for being loſt in old Age, there is a troubleſome *Stillicidium* or Piſſing drop by drop attends that Evacuation.

But the Urine is of many kinds, as we may diſtinguiſh at firſt before we ſay any thing of its Nature; for from a copious aqueous Drink, is made a crude, plentiful, ſoft, inſipid Water, without Smell, and which may be eaſily kept or retain'd in the Body.

But that which is render'd from the *Chyle* already made, is more concocted and leſs in quantity, acrid, ſalt, ſmelling a little, and more irritating; that again, which from *Chyle* is made into *ſerum*, is redder, more digeſted, much leſs ſalter, fætid, acrid, and more ſtimulating, and conſequently cannot be long retain'd.

But that at length, which ariſeth after a continual Abſtinence, by the ſtrong and daily Attrition of the Humours, as alſo from the deterſed ſolid Parts, is at laſt very little in Quantity, very ſharp, ſalt, fætid and red, being ſcarce able to be held at all, and approaches next to Corruption.

Therefore the Urine is form'd of that watery Part of the Blood, which contains the ſharpeſt, ſubtileſt and moſt volatile Salt, next to an Alcaline; the moſt acrid, thin, volatile Oil, and a fine, volatile, impalpable or ſubtil ground Earth.

Yet in the Water of Urine, there is a ſubtil, fœtid, ſtrong ſtinking Oil ſo attenuated, that it is capable of being intimately mix'd with Water, but is difficultly ſeparated.

The Native Soap like Salt, that is analogous to that of *Sal Armoniac*, yet that is different from it, but there is a fix'd Salt firſt of all preſent in Urine, that is taken from a *Marine Salt*; therefore an urinous Salt is not acid, or Alcaline, or Armoniac, or Muriatic, but is endowed with a peculiar Diſpoſition or Nature proper to it ſelf.

The Oil of Urine, attenuated from the Attrition or Grinding of Fat, ſeems to be one ſimple Body, different from all others; tho' by the Mixture of

Salt and Earth in it, it ſeems firſt of all to be of a various and manifold Nature.

Laſtly, The Earth thereof is ſo thin or fine, and appears ſo intermixed with the reſt, that hiding it ſelf amongſt the firſt, it is plainly undiſcoverable, but ſeparated from them, it is ſimple without Smell, undiſſolvable, white and fix'd.

Neither is there any Nutritive, wrought *ſerum*, or good *Chyle*, or Milk ever to be found; and whence is that hinder'd, but either by the Groſſneſs or Fineneſs of thoſe Fluids, and the Windings and Turnings of the Uriniferous Canals.

Neither is ever that neceſſary or requiſite in Health, that is thicker or groſſer in the Blood; its *ſerum Chyle* or Milk. Hence Diuretick Waters, eſpecially thoſe mix'd with Salts; but before all, if they are drank cold: Fermenting Liquors are leſs Diuretick, and thoſe which are oily or fatty leaſt of all; but Acid Wines paſs quick by Urine.

Hence we know how to anſwer theſe Things, from whence comes the Quantity, Colour, Smell, Taſte, Thickneſs, and Contents of Urine, as what ſwims at top and what ſubſides? Namely from the great Variety of different Waters, Spirit, Oil, Salt and Earth, entering into the Mixture of the Urine. Therefore whether the Separation of it thro' the Kidneys, be neceſſary to the Preſervation of Health, or it can be ſupply'd from other ſubſtituted Excretions, we have an Anſwer.

Therefore ſince the Motion of the Humours, the Fabrick of the Body, Ligatures, Injections, Autopſy, Diſeaſes, ariſing from the Interception of Urine, teach us clearly how commodiouſly it iſſues from the Blood by theſe Paſſages only: Therefore what need is there of feigning or imagining in the Stomach and Inteſtines, Paſſages or Holes from their Cavities, that ſend forth an Humour or Liquor into the Cavity of the *Peritonæum*? From thence again in the Membrane extended over the *Pelvis*, and wound about the Bladder, as alſo in the Body of the Bladder, that there are ſuch like Pores every where, which abſorbing an Humour from the hollow of the *Peritonæum*, directly convey it into the hollow of the Bladder? Again, there is no *Remora* or Obſtacle that reſiſts that inward Propulſion, but a ready and moſt expeditious Round. Laſt of all, what need we feign *Phænomena*, when indeed there are none to be obſerved that enforce it, no Arguments that can prove it.

But if we enquire whether it is probable, that the Kidneys contribute any thing to the *Semen*, and what that is? Undoubtedly the Situation of the Emulgent and Spermatick Artery, will inform us ſomething of that; and why Stones and Gravel ſo frequently proceed from the Urine?

The Action of the Muſcles.

AFter ſeeing what is done with the Blood, agitated or mov'd thro' the *Viſcera*, it will be more eaſie to underſtand the Inquiry into that, which is driven by the Muſcles into every Part of the Body, and from thence into that which is moved in the Integuments, encompaſſing the external Superficies of the Body or the internal Cavity.

But there is ſcarce elſewhere, any greater Obſcurity in the minuteſt Veſſels and Inſtruments, that effects the higheſt Diverſity of Opinions, and alſo the Difficulty of the beſt Choice.

For the ſolid Parts of the human Body are either moved by the Agitation of the Humour, that flows thro' them with force; or they are moved by the Help and Aſſiſtance of the Muſcle, that is faſten'd or bound to them; but that being diſunited, cut aſunder, or corrupted, this latter Motion ceaſeth; but this Motion is voluntary, ſpontaneous or mixed.

All Muſcles act or move, when render'd ſhorter, contracting or drawing together their annex'd Solids, or they compreſs, or elſe expell their Humours by Compreſſion. Wherefore all the Difficulty lies in this, that the Fabrick or Structure of a Muſcle be aſſign'd, and its contracting Cauſe, whereof one certainly much depends on the other.

Every ſimple Muſcle yet known, ſaith *Lower de corde*, conſiſts one way of a carneous or fleſhy Belly and one Tendon, which may be again divided into others very like them, but always leſs; and thoſe again which ariſe or ſpring from theſe into leſſer ones are always like the largeſt; and indeed this Diviſion proceeds ſo far, that at length they vaniſh into ſuch an incredible Fineneſs, ſaith *Leeuwenhoeck*, that they exceed all the Strength of Imagination; but Reaſon determines them ſo far, as at laſt to bring them to a point or end; and that very Extremity is ſo like to an entire Muſcle, that it hath its Belly and Tendon as evident as the biggeſt; but is call'd a Muſcular Fibre, the Conjunction or Union of which may properly be called a Muſcle.

From theſe Things it is evident, that theſe Fibres are not Arterial, Venous or Lymphatick Veſſels; but of another Nature, and the Organs much leſs than theſe, whether veſicular, or made by one Tract or Continuation.

Since therefore it is ſuppos'd the Nerves enter into every Muſcle, together with its Arteries and Veins; from thence they are diſtributed, being depoſited there by an external Caſe or Covering, thro' every Muſcular Body, that there cannot be a Point aſſigned in which Part of them are not to be found; then that all the Nerves diſappear, or are not to be ſeen here; that in other Parts of the Body the Extremities of the Nerves paſs as it were into explicite

Nerves; from whence it is concluded that theſe Fibres having from the reaſon of the Thing, the Nature of a Nerve, from the Extremity thereof ſtript of its Covering, admit of the fineſt Expanſion within the Cavity, of the Figure of a Muſcle full of Spirits, which is beſtowed from that Nerve, that ſprings from the *Cerebrum* and *Cerebellum*, continually by the Impulſe of the Heart.

From theſe Fibres united together, are made *Faſciculi* or *Bundles*, which again have a ſingular Membrane, in which they are involv'd, and ſeparated diſtinct from others, but that is as far as the Senſe penetrates. This fine Membrane is cellulous, within full of Oil, which is beſtow'd upon the Increaſe of ſuch Animals as are at reſt, ſerving to defend, anoint and lubricate the Fibres, ſupply'd from the Arteries, as an Injection of *Mercury* informs us.

But the *Artery* agreeable to *Ruyſch*, is brought to the Muſcles, which is diſcover'd in the ſame Place, in that Size and Contexture, that the unwary would judge the whole Body of the Muſcle ſcarcely blown up from this alone. Theſe firſt of all are diſtributed amongſt the *Faſciculi*, and in the Membrane diſtinguiſhing them, and perhaps in the external Superficies of ſome one Fibril; where they end in reticular *Plexus*'s, oleous Secretories, the ſmalleſt Lymphaticks ſaith *Nuck*, and ſometimes into hollow Fibrils, like Nerves; which Fibrils alſo may end either in the Cavities of a nervous muſcular Fibre, or elſe themſelves make ſuch like.

At laſt it is plain that every Branch from the *Arteries* in the Muſcle, hath a Vein anſwering to it ſelf, which united to another makes a larger; from whence the ſanguiferous Veins of the Muſcles and the Lymphaticks are made.

But the Tendon of a Muſcle duly examined, is divided into ſo many Fibrils, as the Muſcle it ſelf, for this reaſon, that the Cavity of the Muſcular

Fibre becoming thinner, from its obtuſe Amplitude growing into one acute Body, is made ſtronger, harder, dryer and narrower, being almoſt deſtitute of Veſſels; from the compact Union of which the whole Tendon is made, hence call'd by the beſt Name *Aponeuroſis*; tho' from another Opinion, from two ſuch Muſcles connected by an oppoſite or contrary Situation, ſaith *Lower* almoſt all the viſible Muſcles are made.

Therefore the Redneſs of every Muſcle changes its Colour from the Blood by which it is waſh'd; but the Subſtance firſt of all depends on the Repletion of the Arteries, Veins, oleous Cells, and Lymphaticks: Hence it becomes diminiſhed in old Age, Leanneſs, *Atrophia*, continual Sweatings or Colliquations; and yet Motion remains in all theſe, Inſects alſo teach us, they can exerciſe or perform Motion, tho' not with red Muſcles, becauſe in them there appears no Fleſh to the Eye.

Fibres, *Faſciculi*, *Arteries* and a *Nerve*, in Life and Death are drawn aſunder, or diviſible without breaking; and tho' they are tenſe, they are endowed with a contractile force, being cut, they ſhorten much, and then leſſen in Subſtance, contracting themſelves as it were into an undulating Superficies, expelling their proper Juices; hence they are always and every where in a violent State, they always endeavour Reſiſtance in their Elongation, and labour to ſhorten themſelves more in Life, and leſs in Death, therefore require an *Antagoniſt*.

Being ſtrongly compreſs'd, evidently contus'd, totally obſtructed, ſeparated or cut off from the *Cerebrum*, the voluntary Action of all the Muſcles, all Senſe and Memory ceaſes; but the ſpontaneous Action of the Muſcles remains in the Heart, Reſpiration, the *Viſcera*, and Vital Part, from a free, open, and ſound Brain.

The ſame Things being done in the *Cerebellum*, the Action of the Heart, Reſpiration and Life it ſelf preſently ceaſes, and the voluntary Spring together with every Senſe, but Motion may continue yet longer, being as it were vermicular, in the Stomach, Inteſtines, and ending there yet may be reſtored.

By the Compreſſion, Ligature, Corruption or cutting off the Nervous Muſcle, all vital and voluntary Motion periſheth intirely in it; and if the Nervous Trunk thus ſuffers, whoſe Branches are given or diſtributed to various Muſcles, the ſame thing happens to them all.

From the Performance of the ſame Facts in any Part of the *Medulla Spinalis*, the Action of all the Muſcles periſh, whoſe Nerves under the Place affected, ſpring from the *Medulla*; and ſo the contrary; the ſame Experiment in the Artery, diſtributed to one or more Muſcles, anſwers the ſame Teſt.

The Tendon of an acting Muſcle ſaith *Lower*, is ſcarce alter'd to your Senſe, the Fleſh is ſhortned, hardens, changes colour, ſwells, bunches out, the Tendons approach each other by turns; the Part annex'd with the Tendons is lead toward that, which being leſs moveable is knit to the Tendon: This Action is call'd the Contraction of a Muſcle.

In the ſame Tendon of a Muſcle not in Action, the Fleſh is longer, ſofter, redder, flat and ſubſiding; this State or Condition is call'd the Reſtitution of the Muſcle, altho' it is almoſt done by the Strength of the Antagoniſt; for from that weight made, the Contraction remains ſpontaneouſly in the other, not from the æquilibrated but prevailing force or ſpring of this.

One Antagoniſt, acting and the other not, is as the bending of a Joint or Limb, but if both move together it remains motionleſs; if neither act 'tis indifferent, as it is moved by that, whereby the leaſt

Exceſs of either leads, whether made by Addition or Subſtraction.

But theſe Changes are made by turns in the minuteſt moment of time, and throughout the whole fleſhy Part of the entire Muſcle, and therefore may be abſent or preſent reciprocally, yet leave no Tracings or Footſteps thereof in the Body.

Any warm Liquid being injected into the Artery of a Muſcle, that is not in Action, tho' of a dead Perſon, makes or raiſes the Contraction thereof; notwithſtanding this be tryed ſometime after Death.

The Subſtance of a contracted Muſcle appears rather encreaſed, than leſſen'd in every Experiment.

By the external force of a bent Joynt, tho' by the Endeavours of the Will, the bending Muſcle alter the acting State in the very Flexure of this Contraction; and if it had been agitated by a proper Motion, yet it had been ſcarce ſo powerful.

Nothing being determined from the Will, all the voluntary Motions are equally fill'd and mov'd in all their Veſſels, from the Blood and Spirits, being equally moved by them, and that together thro' the whole Body.

From which certain explor'd *Phænomena*, the Properties of the latent Cauſe are evident, and the Muſcles of the moving Cauſe, to wit,

Firſt, It may be abſent and preſent in the Muſcle.

And therefore Secondly, To enter in and go out thereof.

Thirdly, To be derived otherways into that, otherways out of it.

Fourthly, And that in a twinkling, or rather the very moment of the Will's Efficacy.

Fifthly, And in the very moment of time, in which the Muſcle is contracted, internally to puſh forwards, to every point of the Superficies of the

Muſcular *Villus*, or hairy Nap of the Skin, as alſo into the contrary Parts.

That is Sixthly, It ought to be equally diſtributed together, thro' all the Fleſh of the Muſcle.

Seventhly, Therefore to dilate and fill the Membranes of the Fibres; change them from an oblong Figure into a rounder, increaſe the leſſer Diameter, and leſſen the greater, and to apply the Tendons alternately to each other.

Eighthly, Laſtly, It ought to ariſe from the *Cerebrum*, the *Cerebellum*, and the Origin of the Nerves, and may overcome thoſe Reſiſtances, which ſeem here ſufficiently forcible.

Ninthly, To conclude therefore, the moſt fluid, ſubtileſt, ſwifteſt Body is required, being apply'd with Strength or Energy in the Muſcle.

Which requiſites, are to be found in the nervous Liquor and in nothing elſe; and therefore this muſt be own'd or acknowledg'd for a real Cauſe; neither is its Action difficult to be underſtood.

For it muſt be granted or laid down as a Fundamental, that the Spirits flow ſwifter, from whatever Cauſe they proceed, from the firſt Origin of one Nerve, than by the reſt; that more run or enter into a Fibre open to this Nerve, and therefore that this will be more dilated; will ſend forth the ſtrength of its Spring at the ſame time, be paſſive and active; and the ſame Cauſe continuing much more will happen, therefore it will grow wholly turgid in the ſhorteſt, and the ſame Determination remaining, will laſt contracted; which as long as it happens in infinite Fibrils together, as to Senſe, the whole Muſcle is in the ſame Condition.

It neceſſary follows from this Celerity encreaſed in one Nerve, the others are moved much leſs, and therefore theſe being relaxed, perform the Encreaſe with more Exceſs of Strength in the Contraction.

From which two Cauſes, all the Fibres ſwelling from the great force of the Muſcle, bind cloſe the Intervals placed betwixt them, and the Blood Veſſels ſeated there; from whence the Veins are evacuated, the Arteries compreſs or ſqueeze the thicker Parts, that is, they repel the red Blood, and from the ſubtil force of the Heart and its own, drive them into the minuteſt Canals; and ſo from the expulſed Blood, we ſee the whole Body of the Muſcle moved, by the ſubtil Humour running together, thro' the Nerves and Arteries; which is manifeſt to every Body's Satisfaction: For that is drawn, which is affixed to the prolonged Tendon, if ſo be it reſiſts leſs the contractile force, howſoever with the leaſt Exceſs.

But this Cauſe ceaſing, the Elaſticity of the Fibres, the equal force of others, the circumpoſited Parts acted beyond their Tone, from that contracted Muſcle, reſtore together an *Æquilibrium* in all Parts. Therefore in every *Phænomenon*, and every Requiſite, this is made plain, from underſtanding the Structure and its Cauſe, here plainly preſent in the Body: But only an aſſumed Power in the Origin of the Nerve encreaſes its Celerity; that being common to every *Hypotheſis*, neither can this be explain'd.

Therefore *Galen*'s incorporeal Faculty inflating the Nerves, is of no Service; nor the nitrous Spirit of the Nerve mixed with the Oil of the Blood accended and rarefied; much leſs the Acid Spirit of the Nerves, with the Alcaline of the Blood, or the Ebullition of the Air and the Arterial Juice; or the attractile Strength increaſing amongſt the ſmalleſt Particles of the Humours: For theſe Things are repugnant to the *Phænomena* of the Organs of Senſe, of Matter, Mixture, Proportion and Duration, nay, there is no neceſſity for them at all.

But that Influx happening equally into all the Muſcles of the Body together; cannot at the ſame time flow into the Heart being contracted, but muſt be thrown into its Nerves; from whence this, impleted by the *Auricles*, the *Vena Cava*, and the *Pulmonary* in its Cavities, by the Coronary Arteries in the Subſtance of the Heart, and by the Nerves in their *Muſcular Villa*, in a moment is violently contracted; afterwards relaxing, is fill'd again, and ſo alternately is always in Action and at Reſt.

But how much or great this Muſcular Force is, he only underſtands that knows, 1ſt, The Place where the contracting Tendon is inſerted to the contracting Part, as to diſtance from the immoveable Centre, about which the Flexure is made. 2ly, the Obliquity of Direction by determinate Angles, which are here frequently very acute. 3ly, The Weight of the very Part moved. 4ly, The Weight of the Body hanging to and raiſed up, together with the Place in which it is apply'd. 5ly, The Duplication required to the utmoſt of their Strength, that a drawing might be made towards a fix'd point; which the incomparable *Borellus* hath demonſtrated from Mechanicks.

But how ſuch a Spring or Force can be given to the Muſcles by the Nerves; *Mariot* hath explain'd to us, in his Hydraulick and Hydroſtatick Engines; and that the Strength of the Muſcle is directed with wonderful mechanical Helps, which are: 1ſt, Membranous Shreads or Bands, largely expanded, ſurrounding the Muſcles and ſubjected Tendons, and coercing or binding them cloſe, as at the *Carpus* and at the Feet. 2ly, Broad Muſcular Bands, ſuch as are in the Arms, Back and Thigh, ſaith *Veſalius*. 3ly, Or according to *Cowper*, that are in the cartilaginous *Trochlea*, as in that of the Eye, or in the oſſeous ones, as in the *Pterygoſtaphilinus*. 4ly, In another tranſmitting and directing Muſcle, as ſaith *Caſſerius*, is in the *Stylocerato-hyoidæus*. 5ly, The Tendons of the Muſcles, ſuſtaining, elevating and directing or guiding the *Hypomochlea* ; as the *Patella*, ſaith *Veſalius* in the Knee, the *Seſamoide Bones* at the Articulations of the Fingers, with the *Appendixes* annexed to the Bones, as the *Trochanters* are in the *Os Femoris*, according to the ſame Author, with the Circumduction of the Muſcles themſelves about the Bones, as the *Marſupialis*, as *Spigelius* calls it, or the internal *Obturator*.

But the contracting Force of the Muſcles is encreaſed, much more as the Muſcles are compos'd of many ſmaller Muſcles, all which by uniting their Tendons into one, agree to make its Strength much greater ; as for Example in the *Deltoides* of *Lower*, the Pectoral Muſcle and *Biceps humeri* of *Veſalius*, the *Triceps Femoris* of *Spigelius* ; for as there are many Fibres, the Muſcle is ſtronger ; as the Fibres are longer, they are ſo much the fitter for a greater Flexure.

The ſingular Action of every Muſcle is eaſily known, if the Connexion and Direction thereof be known, and the appointed Motion of the Parts, with which the Tendons are united.

Therefore the voluntary Muſcles have Nerves, deriving themſelves laſt of all from the *Cerebrum*.

But thoſe which ſerve for ſpontaneous and vital Motions receive their Nerves from the *Cerebellum*.

A Motion remaining in the Fibres after Death, is from a ſpontaneous Contraction, or drawing together of the Veſſels and Fibres.

But a Contraction of a Muſcle, does not by any means proceed from a ſpontaneous Contraction, or a Contraction of a Nerve.

Tho' the Nervous Juice acts ſtrongly on a Muſcle, yet it injures not the Nervous Pipe ; as from Hydraulicks may be ſeen.

A Muſcle too long and powerfully ſtretched, grows painful, and is inflamed, the Reaſon is ſhown in the Example of the *Tetanus*, which is a Rigour or Diſtention of the Nerves.

The Muſcles being alternately moved and relaxed, the Blood is reciprocally expreſs'd and admitted with great violence, by which means it may often and in every Part, be attenuated, diſſolved and ground, as in the Lungs, *&c.*

And this agile Effect is beſt underſtood, by comparing the Difference betwixt Exerciſe and a chearful Way of living, with that of a melancholy and ſedentary Life.

In too much Idleneſs, the Oil collected in ſound healthful Bodies, compreſſes the Veſſels, and cloſes the Fibres.

An Animal exerciſing the Motion of the Muſcles too much, grows lean, as Horſes and other Beaſts.

Age and a laborious Life, changes almoſt all the Muſcles into Tendons, and thoſe into Cartilages and Bones.

The Function or Office of the Skin.

THere is a cellulous Membrane ſaith *Malpighius*, ſpread over all the Muſcles under the Skin, which is furniſh'd with Arteries, Veins, Nerves, Lymphaticks, and oily Cells, very dilatable, and which is able to grow out to any Dimenſion, encreaſing from Fat that ſtagnates in round Cells, tho' it is fine and oily; this being ſecreted by a ſlow Motion into additional Bags, ſerves for defending, lubricating and unctuating the Muſcles; and may be of uſe to temper the Acrimony, and put a check to the violent Motion of the Blood.

Near to this Bed of Fat lies a thick Congeries or Heap of Nerves under the Skin, wrought into the Form as it were of a Membrane, render'd tough and groſs from the hard Integuments of the Nerves, and every where compos'd of Arteries, Veins, and lymphatick Veſſels; from whence ſeveral other Things incumbent thereon ſhew themſelves.

But for thoſe Nerves, ariſing from that Texture, they form *Pyramides*, which depoſiting an exterior Covering beſtowed from the *Dura Mater*, by thoſe *Exuviæ* or little Skins, they compoſe a reticular or uet work Body, diſcover'd firſt of all by *Malpighius*, in the Feet, Hands and Tongue, but ſhown more elegantly by the famous *Ruyſch*; which being pierced thro' by as many *Foramina* or Holes, as there are *Papillæ* or Nipples ariſe, it tranſmits thoſe ſoft nervous Pipes or Conduits throughout the whole.

From thoſe nervous interwoven *Stamina*, at certain Places there ſpring up fine acute or ſharp Bodies, call'd Hairs ſaith *Malpighius*; of which others from the very Glands of Fat ſeated betwixt, riſe deeper, and being propuls'd from beneath, dry in the Air ſerving for a Defence to the Skin, and to cloſe the Pores

But there are innumerable Branches from the *Arteries* under the Skin, that being diſpers'd and interwoven, ſend forth ſubtil, fine Veſſels, which opening outwardly, emit in Health, a thin, volatile, odorous, ſalt, inviſible Vapour, perſpiring under the *Epidermis*; but theſe Pipes being more relaxed, or the Humours more agitated, it iſſues in form of Sweat.

But the ſubcutaneous Veins made by the like *Apparatus*, opening their ſmall Veſſels outwardly, ending in them, exhaling nothing, receive extrinſically the Liquors inſinuated into them, and firſt mix *Lympha*, and then Blood, as many and certain Experiments teach us

But there are in the external Skin *Meatus*'s or Paſſages that are large, perpendicular, deep and cylindrick, in which internally on all ſides, the exhaling Mouths protrude their Fluids, which being there collected, ſtagnating and drying, they paſs into a vermicular Paſte, that growing black in the Air, is oftentimes the Cauſe of many cutaneous Diſeaſes.

Upon this ſaith *Ruyſch*, lies the *Epidermis*, or Scarf Skin, entirely ſeparable from that underneath; diviſible into many *Lamellæ* or Scales, conſiſting of no Veſſels, that can be made viſible by any Art; endowed with no Senſe, being wholly ſquammous or rough, ſo that it is incredible, ſaith *Leeuwenhoeck*, to ſee the ſmall Scales, cut into various Figures, the Furrows, Holes, *&c.* that are in it agreeable to *Malpighius*, and which are chiefly to be ſeen at the ſpiral Tops of the Fingers: In the middle of theſe Furrows the ſudoriferous Veſſels lie ſecurely, but on each Parallel ſide of the Furrow, a *Series* of nerveous *Papillæ*, from whence it is manifeſt, the ſweating Veſſels and thoſe of Perſpiration, the *Papillæ* of feeling, *&c.* are defended by this ſlender Covering.

The Excretion of Sweat.

UNder the Skin it ſelf upon the Fat, throughout the whole Circumference of the Body, are ſeated the milliary Glands, cloſely united and compos'd, or made up of an Artery Vein and Nerve, forming an emunctory Veſſel, that ariſes by a *Foramen* in a reticular Body, that ſpues our Sweat by an open Orifice under the *Epidermis*; and is cover'd with a hollow Valve, rais'd up and round, that is, poſited under the *Cuticula*, powerfully to tranſmit and coerce the Humour; this is the Principle Organ of Sweat, to which from thence, other Veſſels of *Ruyſch*'s Diſcovery are added.

The *Sweat* thus ſecreted, is different according to the Difference of Air, Climate, Sex, Age, Diet, *&c.* as hath been ſaid of Urine.

In a healthful State there is ſcarce any, except from an Error of the *Six Non Naturals* : In its firſt Effect, it is always noxious or hurtful ; by Accident ſometimes it is profitable.

The Perſpiration of Sanctorius.

THere are beſides, exhaling or perſpiring Veſſels, under the *Squamula* or *Scales* of the *Epidermis,* that lie obliquely open, but are of that ſubtil Smallneſs, that there are computed 125000 Apertures in the Compaſs of one common Grain of Sand, according to *Leeuwenhoeck* : From theſe a ſubtil Humour perpetually perſpires from every ſingle Point of the Body, call'd after the firſt Inventors Name *Sanctorius*'s Perſpiration, to which Invention and the Perfection thereof, the Glory of this Opinion is owing.

This Exhalation is made throughout all the external *Epidermis,* as alſo in the *Cuticula* of the Mouth, Noſe, Jaws, *Larynx*, Lungs, Gullet, Stomach, Inteſtines, Bladder and Womb ; from whence the Quantity thereof exceeds the aggregate or collected *Fæces* of all the other Excretions ; for in the Air of *Italy*, in a vigorous State of Life, and moderate Diet, it equals five eights, of whatſoever is eat or drank.

The utmoſt Fineneſs, a regular Equality, great Plenty, together with the Lightneſs to the Senſe, and adding Weight or Encreaſe to the Stature ; Augmentation after Sleep, demonſtrates the Body to be perfectly in Health ; and is a ſpecial Help to the preſerving it ſo.

But a Receſs of Perſpiration from theſe, is almoſt a certain, and the firſt Meſſenger of an approaching Diſeaſe, nay, perhaps the Cauſe of it.

The *Viſcera*, Veſſels and Fibres being ſtrong, effect, preſerve, augment and reſtore this Retreat of Perſpiration : Exerciſe of the Body at the very [illegible]

Beginning of a light Sweat, a moderate Uſe of *Venery* from the Strength of Conſtitution: Seven or Eight Hours Sleep with the Body well cover'd, but not with too great a Weight of Cloaths, Chearfulneſs, Youth, ſolid, light fermenting Food, not too fat, but a little ſeaſon'd, a pure ſerene, dry, heavy, cold Air.

But all things that are contrary to theſe, as well as all the other Secretions, being more increaſed, leſſen, impede and deprave this.

Hence it is plain to us, what this perſpirable Matter is, its Cauſe, Effect, Neceſſity and Uſe, that is paſt repairing in the firſt place, by reaſon of the Flexibility and Softneſs of its Veſſels; eſpecially as the nervous humid *Papillæ* are apt to be affected from the Objects, and by tranſmitting the impreſs'd Effects of thoſe, they are ready for ſuch Actions and ſo continue.

And ſo it is underſtood from the Encreaſe of Sweat, and the Enlarging of its Veſſels, that Perſpiration muſt neceſſarily be diminiſh'd, and the Veſſels thereof compreſs'd.

In like manner, by violent Motion and too much Heat, this perſpirable Matter is converted into Sweat.

But it is greatly aſſiſted from moderate Motion, and Warmth.

But nothing haſtens it, or conduces more towards it, than gentle Frictions or Rubbing, and that continued for ſome time together; but conſtant Sweats and ſuch as are great, relaxe, debilitate or weaken extremely, and that always and neceſſarily will happen to ſuch as labour under, and often die of Weakneſs, *Atrophies*, *Phthiſicks* and *Syncope's*.

But why preſently, and for ſome time after eating, is the Perſpiration ſmalleſt in a healthful Man? and why the largeſt Perſpiration betwixt the Fifth and the Twelfth Hour from Meals? for which reaſon, Riding on Horſe-back, Coach, *&c.* eſpecially a brisk Motion on the Ice, or in Snow, chiefly promote that.

Of Nutrition, Encreaſe and Decreaſe of Subſtance.

THat a human Body may exerciſe all thoſe Motions of the Humours, Veſſels and Muſcles, and that none of them may in the interim be deſtroy'd, there is required a ready Flexibility in the Veſſels, Muſcles and Fibres; to the obtaining of which, the Parts cohering or ſticking together ought to be chang'd, partly from Contact, and partly to continue therein: Which cannot be done, except the great Parts be made up of the ſlendereſt, thinneſt and ſhorteſt; neither can this happen again, unleſs amongſt theſe there conſtantly run a renovating Fluid or Humour that hinders concretion; therefore the whole Body, as it is flexible, ought neceſſarily to be made up of theſe ſmall Veſſels.

Yet in that very Motion, in the Veſſels that are of a fine Structure, aſſiduouſly and violently exerciſed, as well by a perpetual Circumduction of the Humours as the muſcular Actions, the ſmaller Parts are neceſſarily grounded or broken in Pieces from the Solids: The Parts thus exerciſed by grinding, are mix'd with the Fluids, are agitated and exhaled; in the mean time, the Fluids made leſs by continual Attrition, proceed to the perſpiring Veſſels, and vaniſh out of the Body, hence from that Condition, a Live Body is ſoon deſtroy'd.

Therefore for Continuation or a Conſtancy of Life, there is need that there be ſo much, and of ſuch a nature, perpetually reſtored to the Fluids and Solids, as was loſt by thoſe Motions: This is ſaid to nouriſh or ſuſtain, and this Action to be Nutrition.

But the Humours being waſted, as to Matter, from Meat, Drink and Air, as to the requiſite Functions thus far expended, on the concurring Strength of the Body, they are repair'd or recruited, and apply'd to their proper Veſſels.

The Nutrition of the ſolid Parts being ſomething obſcurer, is underſtood from the Knowledge of the following things. Every ſolid part of our Body, is form'd or made up of others much leſs Parts, how like ſoever to the greater: Veſſels from Veſſels: Bones from leſſer Bones, and this Fabrick proceeds on, beyond all the Limits of Senſe, by what Art ſoever aſſiſted, as *Malpighius*, *Ruyſch*, *Leenwenhoeck* and *Hook*, have prov'd by accurate Experiments. Yet this Diviſion ſeems almoſt to proceed to Infinity, as the Nature of the Aliment and Humours teach us.

Beſides, the Microſcope, Injections, ſmall Wounds, bliſtering Medicines, Waſting, Dryneſs inform us, that our Solids compar'd with the Fluids, are but very few: But it is plainly demonſtrable, from the Conſideration of the Riſe and Generation of the Veſſels, and from the Reſolution of the largeſt Veſſels form'd into ſmaller, that the whole ſolid Maſs of our intire Bodies abſolutely conſiſts, or is made up of nothing elſe but mere Nerves or Filaments, as their Elements or Principles.

And indeed all that Maſs, being taken from an incredible ſmall Particle, grows from thoſe things, which before were ſo ſubtil, that they were but juſt a diſſolving or fluxing Liquid, like to that of the nervous Juice; as we have taken notice already in that of the incubated Egg, obſerved by the curious *Malpighius*.

For neither does the White of the Egg nouriſh at firſt, till being incubated, it hath paſſed by that Energy, from the Thickneſs of its Humour, innumerable Degrees of Fluidity, thro' diverſe Waters, at laſt terminating in that Subtilty; but then that Liquor, as yet beſtowed on the *Embrio*, is thick, and is tranſmitted much finer in its Veſſels and *Viſcera*.

But from this ſubtil Humour, the firſt tender Solids ariſing, almoſt like Liquids, they paſs again thro' infinite intermediate Degrees, till at laſt it is brought to the ſolid Parts, as *Malpighius* hath taught in Eggs, and the incomparable *Ruyſch* hath diſcover'd and ſhewn in *Embryo's* and *Fœtus's*; nay, he hath given us an accurate Enumeration of their various Parts. Wherefore it is hence evident, that the Solids in their firſt Riſe from the Liquids whence they are derived, only differ in Reſt, Coheſion and Figure.

Therefore ſuch a Particle now fluid, will make the Part of a Solid, from thence formed, and Strength being added to it, effecting the Coheſion thereof with the other ſolid Parts, howſoever that is performed.

Which Coheſion produced after the beſt manner in a Fibre already made, if the Place be large enough in the Solid that remains from the Particle of the Solid that is deſtroyed, and likewiſe in the Fluid, the Particle anſwering in Subſtance or Size, in Figure and Nature; and alſo the Strength or *Impetus* that intrudes that Particle into that place, or accommodates it there.

Therefore the Nutrition of the Solids is made in the ſmalleſt or minuteſt Veſſels, from the greateſt Conjunction of which they are made, that is, in the Nerves or Veſſels moſt like to them; but ſince that cannot be done, except ſome Liquid be carried into theſe Veſſels: Is it not plainer to you therefore, that the matter neareſt or moſt agreeable for Nutrition, ſhould be a ſubtil nervous Humour, moſt likely or probable for that Uſe?

Don't you from hence believe, that Nutrition is perform'd from the laſt and moſt perfect Actions of Nature? and that it may be done well, it is likewiſe neceſſary, that the former Actions be ſo too. Therefore the *Chyle* may fill the Veſſels, but it cannot recruit or ſupply the Solids; alſo in the Lungs, by the Strength of Reſpiration, the *Chyle* being attenuated, chang'd, ſubdued, mixed, and render'd fit to paſs thro' the Veſſels, is indeed a properer matter than before, but not yet aptly prepared for this Work of Nutrition.

From hence repeating the Operation or Effect of the Lungs, *Viſcera* and Veſſels, there is made a ſoft, tenacious, plaſtick *Serum* that is almoſt taſteleſs and without Smell, growing thick before the Fire, and alſo doing the ſame in Spirit of Wine, likeſt to the White of an Egg; and therefore ſuch a Fluid, in which are all the Conditions, that are in that Humour, from whence we certainly are aſſured, from that ſingle Experiment of an incubated Egg, how all the ſolid Parts of an Animal Body are daily made: Therefore, tho' happening again in a more proper degree, it is not yet made ready for Nutrition, much leſs red Blood; entring into the ſmaller Veſſels, neither one nor the other.

But as the Heat of Incubation, ſo the Action of the *Viſcera* and the Veſſels, on the *Serum* thus agitated or moved about, introduces various Changes, till part of it goes into ſo ſubtil an Humour, as is here required, fit to repair the conſumed Parts; and this is the true immediate nutritive matter.

Which how ſimple it is, taſteleſs, and without Smell, the Fire, Putrefaction and the Chymical Art teach; for they leave behind a mere light inſipid Earth: Yet the laſt matter is not found to be fitly elaborated, unleſs with theſe degrees; but the very ſame Humour often more acrid from the too often repeated Circulations, and being deſtitute of the more liquid Part, render'd ſharp from its Oils and Salts, by that means it is return'd improper and unfit for Secretion. Hence there is a neceſſity of new *Chyle*, and conſequently of Aliment and Drink, as requiſite to this Nutrition.

The manner how, and the Cauſe from whence this is done, are underſtood from what follows. An Humour puls'd directly thro' a full Canal, conick or cylindrick, elaſtick or rigid; if it flows from a broad one into a narrower, or with ſome Reſiſtance made againſt its Motion; it endeavors to make the Sides of its Canal, near the Axis of its Longitude: Which is done every where in the Body, except perhaps in the hollows of the Veins and their Receptacles.

But by this Labour, either conſtantly by Repetition in a leſs degree, or by little and little inſenſibly, theſe Veſſels are length'ned, and by their Elongation, more and more attenuated or ſpun out finer, and that in a ſhort time. Hence the laſt Extremities of the Veſſels, tho' very fine in us, cohering leſs together, that is, being next to a State of Diſſolution, are perpetually affected: Therefore the extreme Ends of the Veſſels are render'd ſo fine and ductile or yielding, that they ſcarce differ from Fluids.

Therefore while that Motion goes perpetually forward in a continued Propulſion, theſe Two are neceſſarily made, firſt of all, to wit, the laſt Particles of theſe fine Pipes being worn away, are carried again, as it were, into a kind of Humour or Fluid, laſtly, in whatſoever Part of the Body they ſtick: From thence the ſmalleſt Particles, which compoſe the fineſt Fibrils by their Union, are ſo ſeparated from each other mutually, that they leave empty Interſtices in thoſe Places, where they adhered before. But this is done every where, and both theſe things happen conſtantly, and that in every Part, as long as it lives, eſpecially where Life is vigorous, and the Actions of the Body violent.

But the ſame Humour, from whence theſe are made, contains abundance ſuch like Particles as they were, which are thus ſeparated or deſtroy'd; it conveys, mixes and applies them to thoſe very Interſtices, but with that *Impetus*, whereby it endeavors to ruin the Canals; from whence it forms, configurates and binds in intermediate Bodies in this Paſſage. So that they adhere and ſtick juſt like the former: Notwithſtanding the Matter, Preparation, Application, Strength and Motion, continue always the ſame; therefore what is loſt, is nicely reſtored. So that the Solids remain as they were, that is, they are perpetually nouriſh'd and preſerv'd.

But that ſhews the ineffable Wiſdom of our Creator in this thing; that the ſame Cauſe which inevitably deſtroys, in like manner, can repair or make again the thing deſtroy'd by the ſame Work or manner of Operation; from whence alſo 'tis taken for granted, by how much greater the Conſumption is, the larger is the Supply: Laſtly, That thoſe Parts, which are firſt of all waſted in the Action of the Body, are preciſely, and that before the reſt, always the beſt recruited.

It is evident, thoſe Veſſels, which are moſt tender and delicate, and beſt adapted or neareſt to the moving Cauſe, are for that reaſon moſt eaſy to be elongated, diſtended, waſted or repaired: Therefore our Bodies, by how much the nearer they approach to their firſt Original, from thence they increaſe and grow out the more.

In the mean time, while that Action goes forward, the larger Veſſels become more extended by their Liquor, but the ſmall ones at the ſame time, whoſe Contexture make the Membranes of the greater,

ter, are render'd juiceleſs, being compreſs'd and growing together, from whence comes the Firmneſs of the Fibres, but the Loſs or Deſtruction of its Veſſel.

Likewiſe ſuch as have been Veſſels ſome time in the Body, are from hence obſerv'd to become mere hard Ligaments; that at length we may be perſwaded, that the Veſſels form a Co-alition, or Union from the concreted Humours by the ſame Neceſſity.

Laſt of all, from the Concourſe of theſe Cauſes, the Strength, Hardneſs, Rigidity and Thickneſs of the Solids proceed; therefore the Number of the Veſſels is greateſt in the *Embryo*, but as Age increaſes, they gradually decreaſe; contrariwiſe, from the ſame reaſon Weakneſs wears off, Strength grows up: Conſequently, in Youth, the quantity and force of the Fluids exceed the Solids; in Age, the Solids in ſtrength and number exceed the Fluids. From whence is underſtood the State of Increaſe and Decreaſe, the Manner, Cauſe, and different Appearance of Death in pure Old Age.

But he that conſiders all this Hiſtory, from hence thoſe things which happen to the Body, and compares them together with that, will ſee indeed that all theſe are perform'd thus; for the whole Cuticle in every Part is conſtantly ſcaled, periſheth, and is renewed again: The Hair, Nails, Teeth, being daily pared, cut, fil'd or the like, grow again: Thoſe Parts that are carry'd away of the Veſſels or Bones, by little and little are increaſed from every Part: The *Sordes* collected from the Extremities of the Veſſels throughout the Body, by waſting or exhaling, beheld with Microſcopes in perſpiring or diſſolving, and examin'd in Water, teach us theſe things are made from the Solids and Fluids, being prepared by waſhing, grinding, *&c.* and are like the former.

From hence alſo is underſtood, that the growing Size of the Body, as to the Habit thereof, in brawny, fleſhy, fat Perſons, is not from the Increaſe of the Solids, but from thoſe collected, ſtagnating, extenſive Humours, that fill the larger Cavities; Hence to be fat, is to be ſubject to Weakneſs and Suffocation; and therefore how greatly ought a Phyſician to diſtinguiſh betwixt Repletion and Nutrition, ſince this laſt ſtrengthens and confirms the Veſſels, but the other weakens, relaxes and extends them.

But Reaſon, from theſe things ſhews, or makes it appear, why the Structure of our Solids is not diſſolv'd by the Liquors contain'd in them? Alſo from whence it happens, that this Machine can ſo long ſubſiſt an active Body? What is the Cauſe, that in corrupted Nerves, the Nutrition of the Part periſheth that is endowed with that Nerve? and likewiſe why the ſame obtains in the Artery? why there is no Solids in the *Embryo*, few in the *Fœtus*, and very many in ſuch as arrive to Age, nay in theſe, Nerves, Tendons, Arteries and Receptacles are made into Cartilages, and afterwards into Bones.

At length we may know how many ſorts there are, and alſo how often the Circulation of the Humours of our Body are perform'd? likewiſe of what kind and how various are the Effects of it? And again, how thoſe Problems are to be ſolv'd, whereby the accurate time is ſought, in which all the Humours together paſs thro' the Heart? And alſo others of the like nature, which may ſeem eaſy to the haſty and unthinking, but are moſt difficult to ſuch as examine with Deliberation, and appear almoſt impoſſible to be reſolved.

Order requires next that we treat of Sleep and Waking; but ſince in them, there is always ſomething to be ſaid of Reſt or Exerciſe, and of thoſe things which relate to the internal or external Senſes; the Order of things now leads me to an Enquiry into the external Senſes, and firſt of common, univerſal ſimple Feeling.

Of Feeling.

THE ſoft, pulpy, medullary, nervous, pyramidal *Papillæ,* ariſing from under the hard, ſubcutaneous Nerves, from the naked exterior Membrane, hence are made truly ſenſible, being moiſten'd continually by a ſubtil Liquor flowing thither, and defended by the thin *Epidermis,* from its pure Senſibility; they lie incloſed betwixt the *Sinus's,* and the little Holes or Cavities under the *Cuticula,* in Places moſt proper for exerciſing the Act of Touching, to wit, in the Tongue, at the very Ends of the Fingers in the Hands, and in the Feet; and this is the corporeal Organ, whereby theſe Bodies are ſaid to touch or feel.

In which this is wonderful, that they are perpendicular in the remaining Superficies of the Body, but lie extended about the tops of the Fingers and Toes, according to the Length of the Fingers; hence, ſaith *Malpighius,* joining with the *Epidermis,* as in a Sheath or *Vagina,* being complicated and dry, they are harden'd in the Nails, rendring them fit for defending the *Papillæ,* and hindring them from becoming callous.

The Touch then is made, when the Tip or Extremity of the Finger is apply'd to the Subject, and the *Papillæ* are emitted from the Attention of the Mind, by gently rubbing upon the *Superficies,* ſo that ſome Motion is impreſs'd upon theſe *Papillæ,* the Effect of which ſpreading to the common Senſory, excites an Idea to the Mind, of Heat, Cold, Moiſture, Dryneſs, Softneſs, Hardneſs, Roughneſs, Motion, Reſt, Diſtance, Titillation, Itching, Pain.

Why elſe is there ſuch Pain from the Senſe of Feeling in the *Epidermis*, from bruiſing, ſcalding, burning, *&c* ? Why the feeling loſt from a thick, hard, callous Cicatrice in the *Epidermis* ? What is the Cauſe of that wonderful Motion of trembling, and the Hands of ſuch growing numb by degrees that touch the Cramp-fiſh ? From ſuch cruel Pain at the internal Superficies of the Nails, affixed to the *Cutis*, and at the Roots thereof ? Why is the Senſe of Feeling ſo acute there, where the cuticular Furrows are ſpiral ?

Of Taſting.

IN the back part of the Tongue, eſpecially at the tip and ſides thereof under the Skin, ſay *Malpighius* and *Ruyſch*, lie hid obtuſe *Papillæ*, which in Taſting emerge from the live, warm, moiſt Tongue, but is gone in Death ; but firſt of all diſtinguiſhable in Hunger : Theſe Spring from a nervous Body, incumbent on the muſcular Fleſh of the Tongue, from whence they ariſe thro' the reticular permeable Body, as hath been already mention'd in the *Cutis* ; then being ſet with erect, little Sheaths of the exterior Membrane of the Tongue, they defend them againſt the Sharpneſs, Acrimony and Heat of the things taken into the Mouth ; but theſe *Vaginæ* are porous, and ſo eminent or diſcoverable, that the ſqueez'd Aliment how great ſoever, runs into them as they receive it.

And it will appear probable, that the *Papillæ* are very numerous, which ariſe, ſaith *Willis*, from the ninth Pair of Nerves, giving one to the Tongue, and which is diſtributed thro' it ; but the Branch of the fifth Pair ſerves it for its muſcular Motion, as is made evident in another Place.

Bellinus proves from Experiments accurately made, that theſe *Papillæ* make that Organ, in which the apply'd ſavoury Objects raiſe a Taſte, but act nothing upon any other Parts of the Mouth, Tongue, Jaws and Palate.

That Matter in Vegetables and Animals, from which Art draws Salt and Oil, either Mix'd, or ſeparate, is the true Object of Taſte, and therefore Salt, Soap, Oil and Spirit, is the ſame as that in Foſſils.

Taſte then is excited, if the matter to be taſted, is attenuated, often diſſolv'd in the *Saliva*, heated in the Mouth, apply'd by the Motion of the Mouth and Tongue, inſinuated amongſt the Pores of the membranous *Vaginæ*, penetrating to the Superficies of the *Papillæ* lurking there, it affects and moves thoſe, and ſo bringing the impreſs'd Motion to the common Senſory, it excites or raiſes in the Mind an Idea of Salt, acid, alcaline, ſweet, vinous, ſpirituous, bitter, aromatick, hot, acrid, auſtere, or ſomething elſe compounded from theſe.

Furthermore, the Cauſe readily ſhews it ſelf, from which ſuch a different Taſte is rais'd from the ſame Subject, according to the difference of Age, Temperament, Diſeaſe, Sex or Cuſtom of other things firſt apply'd to the Palate.

But why ſhould the moſt ſavory things be next to the moſt painful, as ſaline, aromatick and ſpirituous Bodies are, if apply'd to the naked Nerves or the Tongue, when excoriated ?

Why do ſavory things ſoon reſtore or make new again ? Why are Water, Oil and Earth ſo inſipid.

Of Smelling.

THE open Noſtrils proceed from a wide Paſſage tending upwards into a narrower, and being double, are beſt fitted to attract and draw in the Air, applying the more volatile and odorous Parts to its Superficies; eſpecially while they are cloſed together, being united by the Action of the Conſtringers of the Wings, or Riſings on either ſide of the Noſtrils; which, according to *Cowper*, being carneous, are inſerted from the foremoſt lower part of the four Bones of the upper *Maxilla* to the Wings of the Noſtrils.

But the Capacity or Largeneſs of both the Noſtrils, takes in that ſpace into which the frontal *Sinus's* opens agreeable to the Deſcriptions of *Palſin* and *Highmore*; which are chiefly form'd betwixt the remote *Lamina* of the *Os frontis*, under the Eminence ſubject to the Eyebrow, and opening from thence a *Foramen*, that on the upper part communicates to the Cavities of the Noſtrils, next the upper Bone of the Noſe, they receive amongſt them the mucous Membrane of the Noſtrils, with which the whole interior *Superficies* of the Cavity of them, is encompaſs'd and cover'd; and in which the generated *Mucus* diſtills into the hollows of the Noſtrils.

The great Caves of *Highmore* form'd in the upper *Maxilla*, opening themſelves by a gaping *Foramen* into the Cavities of the Noſtrils, alſo receive the ſame Membrane, ſaith *Palſin*, elaborating, collecting and excerning the *Mucus* therein. The little Cells, *Cowper* mentions, of the *Os Cuneiforme* under the upper ſpongy Bone of the Noſe, that frequently by diſtinct *Foramina*, lying open to the Cavities of the Noſtrils, receive the mucous Membrane of them, are cloath'd therewith, ſecern a *Mucus*, and emit or ſend it forth, by this very Paſſage.

There are beſides that, that lie covered in this hollow of the Noſe, being artificially diſpos'd, four little Bones, call'd the ſpongy Bones of the Noſe, there being two in each Noſtril; the upper one, ſaith *Palſin*, is united forward to the upper Part of the maxillary Bone, where it is united to the *Apophyſis* of the *Os frontis*, at the internal Angle of the Eye; the other, ſaith *Cowper*, being the lower, is joyn'd in the lower Part of the Cavity of the Noſe, to the maxillary Bone. Theſe four little Bones are ſo wonderfully fabricated or wrought, from the fine *oſſeous Lamellæ*, being thinner than Paper, and ſo ſituated, that they have ſeveral little cavernous hollows, amongſt which the mucous Membrane ſo inſinuates it ſelf, that it goes in and out, nicely inveſting the Superficies amongſt the *Lamellæ* and leaves the hollow free: Theſe Cavities of the ſmall Bones and all the Cells, opening without any Reſtraint into the Cavities of the Noſtrils.

The Noſtrils are cloath'd with a thick ſoft Membrane, furniſh'd with vaſt Numbers of little Arterial Veſſels, as well as it is provided with round glandulous Bodies, and alſo fine ſmall Veſſels pouring out, or diſtilling a ſubtil *Lympha*. This Membrane inſinuates it ſelf into the Cavities of the ſix *Sinus's*, and the Cells of the four ſpongy Bones, from whence by an admirable Inſtitution, in that ſtrait Cavity of the Noſtrils, the Superficies of this expanded Membrane is much increas'd; ſo that one Part ſcarce gives way to the other.

The olfactory Nerves, according to *Ruyſch*, *Veſalius* and *du Verney*, proceeding without the *Dura Mater*, to the *Os Ethmoides*, apply their tender Fibrils to the little *Foramina*, that are found, ſays *Palfin*, in that Bone, which is penetrated with ſmall *Vaginulæ* or Sheaths from the *Dura Mater*, by theſe the Fibres going out of the *Os Cribriforme*, are preſently diſtributed throughout that whole large Superficies, and that very curiouſly into every *Sinus* and *Cell*.

From whence it is certain, that the Expanſion of thoſe Nerves is very broad, neither are there in any other Part of the Body Nerves ſo ſoft, and therefore uncover'd, and conſequently that can be ſo eaſily affected or hurt as in this Place.

Hence from all that vaſt quantity of Glands in the ſame Membrane, and alſo of Arterial Veſſels ſo plentifully diſtributed here in form of a Knot or Bundle, here is conſtantly prepared and excern'd a ſoft, fluid, inodorous Humour, that is almoſt taſteleſs and without Colour, which moiſtens, lubricates and defends the Nerves on all ſides, and in every deſcrib'd little Cell or Cavern; being always made quieſcent, ſtagnate and inſpiſſate; laſtly, in whatever Part of the Body it is found flowing, it is call'd the *Mucus*: From the Effect of which that is perform'd, which would ſcarce otherwiſe happen; for thoſe tender naked Nerves remain or continue good for a great Number of Years. Yet that this Liquor might not eaſily be chang'd into a cruſt or ſandy Subſtance, by long ſtagnating and thickening too much amongſt the Cavities, and ſo be render'd unfit to paſs out thro' the narrow Ports of thoſe Receptacles; there is a Branch of *Willis*'s fifth Pair of Nerves diſtributed hither, that is, brought from its Union with a Nerve of the ſixth Pair; irritated with which, the *Intercoſtal* and *Vagus* of *Lower*, and conſequently the Nerves of the Muſcles ſerving for Reſpiration are moved, from whence Sneezing being made from the Force of the Air, puls'd or driven by a violent *Impetus*, and ruſhing into theſe Caverns, the *Mucus* is abſterged or caſt off.

But that Part is the Object of Smelling in Animals, Vegetables and Foſſils, which adheres in the Spirit, Oil, Salt and Savour thereof, if it can be ſo divided, as that it be able to fly and be ſpread abroad in the Air: But it is plain from the Number of Experiments, that that ſubtil Body which is call'd Spirit inherent in Oil, is that firſt Mover which excites the Smell; for this being ſeparated from the odorous Bodies, the Reſidue is ſcarcely fragrant, but that being pour'd upon the reſt recovers the Smell.

The Animal breathing thro' the *Aſpera Arteria* or Windpipe, when it is cut in the Neck, and the Air paſſing thro' the Wound, perceiveth no Smell at all, tho' from the ſtrongeſt Scents.

When the Air is expell'd from the Lungs thro' the Noſtrils in Expiration, there is Smelling, the odorous Subject placed without; likewiſe there is ſcarce any in holding the Breath; but the Smell is perform'd by drawing the Air thro' the Noſe.

But the ſtronger any one draws, and the quicker he expells it reciprocally by turns, the better the Action of Smelling is perform'd.

By Motion, Heat, Grinding, and the Mixture of different things, by a cautious Mixture of Salts to the oleous odorous Subjects, the Odour of the things to be ſmell'd is increas'd.

Therefore the Senſe of Smelling is perform'd, while the odorous *Effluvia* contain'd in the Air, are ſtrongly enough attracted or drawn thro' the Noſtrils by the Motion of Reſpiration, and in that Figure are apply'd with Force to the olfactory Fibrils, from the Poſition of the little Bones united thereto, they act thus upon them, and communicating this Action to the common *Senſory* they excite the Smell of Acid, Alcali, Aromatick, Putrefaction, Wine, ſweet or ſour, and ſo on.

Hence we may readily underſtand, how great an Affinity there is betwixt odorous and ſavory Things, or betwixt the Objects of taſting and ſmelling.

Why do Odours oftentimes reſtore Life in a moment?

From what Cauſe do they ſometimes occaſion Diſeaſes, and Death it ſelf; nay, almoſt all kind of Operations medicinal and poiſonous?

Wherefore in different Men does the ſame Smell produce ſuch different and oppoſite Effects, from the ſame thing ſmell'd to?

How comes it to paſs, that Animals who have the longeſt Beaks, or Bills, the largeſt ſpongy Bones, ſhou'd yet enjoy the quickeſt Smell?

What is the Reaſon, why a fœtid Exhalation from the putrefied Parts of Animals, or Vegetables, once impreſs'd on the Noſtrils, ſhou'd ſtick or remain there ſo obſtinately, and with ſuch Trouble for ſo long a time?

The ſtrongeſt Odours are they not apt to ſneeze?

What Uſe is there of the Humour and *Mucus*, daily generated and diſtributed thro' the Noſtrils?

Why is a dull Smell quicken'd after ſneezing?

Is that Humour ſerviceable for purging the Brain? And how far?

Whether is the *Mucus* when generated at firſt thick? Or is it made ſo afterwards?

From whence comes ſuch a great Communication of the interior Noſe with the Muſcles ſerving for Reſpiration, and the *Abdominal Viſcera*?

Is not ſneezing a Convulſion thence therefore, it wearies ſo, often creating Pain, and ſometimes Death?

Of Seeing.

THE Ridge of Hair that is placed Arch-wiſe, on the riſing Part of the *Os Frontis*, is call'd the *Eye-brow*; the erect, ſtiff Hairs that are born on the external Edge of the Eye-lids; ſpringing from their little Bulbs, are call'd the *Eye-laſhes*, which hinder ſmall light floating Bodies from falling into the Eye, either from above, beneath, or ſideways.

The Muſcle call'd the Depreſſor of the Eye-brows, ariſes on either ſide, from the Bone of the Noſe, where it is joyn'd to the anterior *Apophyſis* of the *Os frontis*, and inſerted in the finer Tendons under the elevated Part of the Eye-brow; making it a better Defence for the Eye to preſerve it from Filth and Duſt; and alſo a Shade to the Eye, being placed into bright a Light; whilſt contracting the *Supercilia*, it draws it to the upper Eye-lid, and compels them mutually to come near or joyn each other; but the frontal Muſcle ſaith *Veſalius*, elevates again the *Supercilia* where there is occaſion.

Both the *Eye-lids* being membranous, thin, plyable and vaſculous, are always moiſt in the internal *Superficies*, being furniſh'd with a broad cartilaginous Arch, where they happen to be open or ſhut by turns, or removed by repeated Endeavours, they likewiſe defend and clear or purge the Eye: For the *Elevator* of the upper Eye-lid ſaith *Fallopius*, ariſing from a narrow carneous Beginning, out of the very bottom of the oſſeous Orbit, going upon the aſcending Muſcle of the Eye, being diſpers'd into the fine tendinous Fibrils, is inſerted to the upper Part of the whole *Tarſus* of the Eye-lid; which moving elevates the upper Eye-lid without wrinkles, but the orbicular Muſcle of *Cowper* and *Bidloo*, ariſing from the larger Bone of the Noſe, interſpers'd with orbicular Fibres thro' each Eye-lid, by contracting it ſelf like a *Sphincter*, and joyning by a moderate Motion to another, it preſſes the Bulb of the Eye with a ſtronger Contraction. But the lower *Eye-lid* is open'd by a ſpontaneous Contraction of Muſcular Fibres, diſtributed in the *Eye-lid*, according to *Bidloo*.

But leaſt the Eyelids continually winking, ſhou'd be excoriated by ſqueezing together, there are in the ſide or border of each of them, ſaith *Valſalva*, little granulated yellow Glands, that ſeparate an Humour as it were from Fat and Wax mix'd together,

ther, which ſerves to anoint and lubricate the Edges of the ſame.

The innominate Gland, as *Bidloo* deſcribes it, being large, broad, compreſs'd, rough and conglomerate, is ſeated betwixt the Orbit, towards the external Angle of the Eye near the rough Chink, wrapt up in Fat, ſupply'd with Arteries, Veins, Nerves, Lymphaticks, and *Hydro-opthalmick* Ducts; making from the Arterial Blood a ſalt, watry, pellucid, ſoft Humour, always in ſome ſmall Quantity, but in much greater upon rubbing the Eye, or from the Action of compreſſing the *Orbicular*; the Tears fall down betwixt the Bulb of the Eye, and the internal Superficies of the upper Eye-lid, moiſtening, lubricating and waſhing the Eye; being of uſe to hinder it from Concretion or ſticking to the Eye-lids; and this abounding Humour is call'd *Tears.*

Certainly, each of theſe Humours being of one Figure, with abſters'd *Sordes* and the determinate Concourſe or Meeting together of the Edges of the Eye-lids; which being ſhut, leave a ſpace, in the great Corner of the Eye for receiving theſe; which being form'd from a ſpongy Caruncle poſited there, is determined into that ſpace; there the groſſer Part being fixed and gather'd into the Roughneſs of the ſaid Caruncle, it turns being dry'd into a gummy Subſtance, but the liquider Part, wonderfully preſs'd by a determinate Motion into the dilated *Foramina*, ſeated in the extream Angle or Corner of each Eye-lid, which are call'd the lachrymal Point; brought out from which, the lachrymal Canals run together along that Caruncle, into a lachrymal Bag placed in the Canal of the Noſe ſaith *Veſalius*, which is made from the meeting together of the *Os Unguis*, and the Fore Bone of the upper *Maxilla*; from which by a Pipe that is always open, it is carryed into the Cavity of the Noſe, immediately under the inferior ſpongy Bone; from whence the Cauſe is known why from Perſons crying, there is a *Stillicidim* thro' the Noſe; and why in a healthful Conſtitution, all that Humour vaniſheth.

So Eyes that are expos'd to the Air, are preſerv'd moiſt, clean, pellucid, ſlippery, moveable, warm, being quickly freed from all ſharp or acrid Things, as equally expanded from the diſtending Cauſe within.

The Structure of the Eye and the Action thereof, which depends on it, is beſt underſtood, if beginning from the optick Nerve, we contemplate it thence in that Order, to which all its other Parts and Functions relate.

From the utmoſt Region of the medullary Subſtance, ſaith *Vieuſſens*, which produce the optick Nerves under the *Corpora Striata* of the *Cerebrum*, according to *Willis* tending forward, they are accurately united under the *Infundibulum*; afterwards going back again, they come to the round *Foramina* of the bony Orbits, impreſs'd on the bottom of the Eye, in all this Courſe being ſoft and porous, according to *Ruyſch*, they are cloath'd with a ſingle thin Membrane of the *Cerebrum*, made up of many Arterial Veſſels, they run ſecurely under the ſuſpended Brain, in their Paſſage thro' theſe *Foramina*, being cover'd with the hard *Meminges*, they receive that as a Sheath ſtrongly joyn'd to the former Tunicle, ſo penetrate themſelves amongſt the Cavities of the bony Orbits, and there the *Dura Mater* it ſelf is ſeen water'd with many little *Arteries*.

Theſe internal long Orbits, ſurrounded by the *Perioſteum*, and fill'd with much Fat, receive the *Bulb* of the Eye, as it were like a Bolſter, ſtrengthning, defending, lubricating and aſſiſting its Motion.

From thence that *Vagina*, or Sheath given from the *Dura Mater*, entring by the optick Nerve the Orbit upon the ſaid Fat, by and by ſpreads it ſelf almoſt into a perfect Globe, membranous and hard as it were like

Leather covering the whole Eye, growing by degrees leaner, thinner on the Fore Part, pellucid and more prominent; it is call'd the *hard* or *ſcelerotick* where *opace*; but the *Cornea*, where thinner and pellucid, firſt of all ſerving to ſtrengthen its Figure by its Supply of Veſſels, and the ſuſtaining Muſcles and Tendons. For by this ſaith *Ruyſch*, the Arteries and Nerves enter in.

But that Membrane which incloſes the Optick, was from the *Pia Mater* entring into the *Orbit*, and encompaſſing the hollow Superficies of the *Scelerotick*, diviſible into Two *Lamella*, endued with infinite diſtinct *Arteries*, from a different going according to *Ruyſch*, it proceeds forward to the Place, where the *Scelerotick* makes the *Cornea*, where receding firſt of all inwardly from the *Scelerotick*, it gives a fine ſubtil membrane, Covering the vitreous or glaſſy Humour, in the next Place, the Tunicle or Coat call'd the *Uvea*, in the middle of which is the *Pupilla*, the contiguous *Lamella* and incumbent on the hard one is call'd the *Choroeides*, that which falls into this the *Lamella Ruyſchiana*.

But while the Edge or Brim of the *Choroeide* running out, forms the *Uvea*, it alſo receives Nerves from thoſe which are call'd to the *Scelerotick*, and perforating this and the *Choroeide*, communicated here to that, they are divided into many: From theſe and the Membrane, the exterior muſcular Fibres of the *Uvea* are made tending from their riſe towards the Centre, they end in an orbicular Rim or Border, conſiſting of muſcular orbicular Fibres, which bound the Space and Figure of the *Pupilla*: This Rim being reflected backwards towards the interior Parts, binds the internal right Fibres of the *Uvea* in like manner, receiving it larger from the triple exterior one: From whence it appears the orbicular Conſtringe the Longitudinal, to dilate the *Foramen* of the *Pupilla*. But the little ſlender Membranes,

branes that are pellucid connecting the Fibres, are cover'd with the darkeſt Colour, where they regard the back Part of the Eye.

Alſo in the ſame Place in the *Uvea*, is a wonderful Arterial Structure form'd into little Rings, and from thence ſent into many ſpreading Branches: But before thoſe Arteries from whence theſe are riſen, in the *Choroeide Tunicle*, ſuch like admirable Fabricks are opened: But the Contemplation of this eminent *Apparatus* teaches us, that there is made in the ſame Place the higheſt Attenuation of the moſt ſubtil Humour, and an eaſie Reduction of the groſſer Portion.

In the mean while, from the ſame Place, the Circumference of the *Choroeide* riſing out of that fine little Membrane, is alſo formed from the arched muſcular Fibrils embracing the Gibbous, ſwelling the annular Superficies of the vitreous Humour, where it ſhews it ſelf out of the tender Chryſtalline; but the fix'd Beginning of theſe is in that Orb of its own riſing, the moveable End in that Orb of the vitreous Humour, where it leaves the tender Chryſtalline; the Diſtance of theſe is greater than that of thoſe which is in the *Uvea*, which diſtance the black Colour fills; and alſo the Blood Veſſels are found there after the ſame manner, as in the *Uvea*.

But the yielding vitreous Body is bound in with the reſt, by the proper ſubtil little Membrane, joyn'd on every ſide with the thin-ſlender Bands in the Cavity of the *Choroeide*, which is ſo fine that it ſcarce appears, eſpecially by reaſon of its pellucid Nature; but by the Diſtillation of the Water falling from the vitreous Humour, it is found in this ſmall Membrane.

In the exterior Cavity of the middle Superficies of the vitreous Humour, the Chryſtalline *Lens* reſides unconſtrain'd in its lower Superficies, being faſtned thereto by the Aſſiſtance of the vitreous

Membrane, and alſo the Help of its own thin Membrane: But theſe little Membranes, and the Bodies bound or confin'd therein, are ſo pellucid and fine, that they are plainly tranſparent; yet Reaſon teaches us, they are made up of their ſmalleſt Veſſels, and *Ruyſch* hath made them evident in the greateſt of Animals the *Whale*.

At length the medullary interior Part or Portion of the optick Nerve, enters into the bottom of the Bulb of the Eye; ſo that the Place of this Ingreſs by reaſon of its Altitude or Heighth is in the middle, but on Account of its Latitude it is ſo ſituated, that it ſcarce ſticks in the third Part of diſtance from the internal Angle of the Eye, meaſuring the Diameter of the Eye breadthways. From whence the optick *Axis* does not fall in the Place of this Ingreſs, but recedes much from thence towards the exterior Angle. But this *Medulla* being enter'd in, by and by expands it ſelf in the bottom of the Bulb, riſing on every ſide under the *Vitreum*, at the Ingreſs of the larger Arteries, ſtretching together with that, it is fill'd up and encompaſs'd; the Remainder that lodges there like a tender thin *Mucus*, is call'd the *Tunica retina*.

The Cavity of the Eye form'd from the hollow *Cornea*, and the Convex Superficies of the vitreous Chryſtalline Body, is full of a thin, pellucid Humour, taſteleſs and void of Smell, preſently growing up or filling again; and therefore is ſoon exhaled, extending and preſerving the flaccid *Cornea* into an equal Convexity; ſuſtaining the *Uvea* ſuſpended, moſt liquid in Youth, by little and little growing more opace, thro' various degrees, often turning to white in Age; it ſeems to ariſe from the Arterial Blood, prepared in the *Choroeide* and the Arterial Rings of the *Iris*, and perfectly elaborated from the vitreous Humour; from whence being farther attenuated in the Arteries, from which the ſmalleſt

Lymphaticks ariſe; afterwards tranſuding thro' their open *Foramina* on all ſides, in the internal Superficies of the *Cornea*, *Iris*, *Uvea*, vitreous Membrane, and the tender Chryſtalline one into this Cavity; from thence it is perpetually reabſorpt by the open Mouths of the lymphatick Veins, without leaving any *Fæces* at all behind; to which Work *Nuck*'s Ducts and thoſe of others are uſeleſs here; therefore it is moſt ſerviceable in this kind, for preſerving, moiſtning and lubricating this tender Part, and continuing them in a pellucid State or Condition.

The ſolid Chryſtalline *Lens* or Humour, being ſpherical on both ſides, is form'd or compacted of innumerable ſpherical fibrous Segments, ſtrictly united and pellucid, thicker or cloſer than the aqueous and vitreous Humour poſited in that place, where the *Axis* of Sight paſſes the Centre thereof, and makes its *Axis*; nearer to the *Cornea* than the *Retina*, conſiſting of a vaſt Number of Veſſels, as the Dryneſs, Loſs of Weight, and Contraction of Body teach; this is improperly call'd the Chryſtalline Humour; it ſeems to receive Veſſels to it ſelf, from other continued ones.

The vitreous Body alſo is moſt pellucid, and yielding, thicker than the aqueous Body; on every ſide Vaſcular, as the Humour flowing out of a Puncture and the Dryneſs thereof teach: Hence likewiſe it undoubtedly conſiſts of a circulating Humour, of contracted crooked or bending Fibres, of a depreſſed Ring elevated in the middle, hence raiſed gently from the Chryſtalline, brought to the *Cornea* made from the remoter *Retina*, reſtoring it ſelf by the relaxed Fibres in that Ring, and ſubſiding in the middle, it performs its Function at the bottom of the Eye, the Chryſtalline being ſlowly drawn to it.

The Eye being thus fabricated, and placed in its Orb, receives a Membrane from the Fore Part that is lax and moveable; ariſing from the *Perioſteum* out of the external Circumference of the *Orbit*, which is a vaſt vaſculous pellucid Covering, for the whole Fore Part of the Eye, by which the Bulb thereof is confirm'd in an eaſie natural Motion.

Then the four Muſcles, *Cowper* mentions from *Bidloo*, ariſing carneous from the Circumference of the greater *Foramen* of the *Orbit*, aſcending about the Bulb, growing tendinous about the middle, ſo fix'd into the *Scelerotick*, and being connate to that, they elevate and depreſs the Eye, bring it to and lead it from the Noſe, they roul, compreſs and elongate, as ſingle, or as they act in various Motions. From thence the ſuperior oblique Muſcle ariſing from the bottom of the *Orbit*, towards the *Attollens* with a carneous Beginning, furniſh'd with a carneous Belly in its Progreſs, is chang'd into a round Tendon, which paſſes thro' a cartilaginous Pully, betwixt the anterior Parts of the *Orbit*, towards the Noſe, from thence going back again, the Bulb is inſerted in the middle Place betwixt the *Attollens* and the Ingreſs of the Optick; ſo makes it that the Bulb carryed round, towards the Noſe, about its own *Axis*, may be led outward from the *Orbit*, and the *Pupilla* likewiſe may be turn'd downward. But the Inferior oblique Muſcle being carneous from the exterior, in that inferior Part of the *Orbit*, which joyns here the Bones, ariſing betwixt the *Abducens*, and the optick Nerve inſerted with its Tendon; makes it that the Bulb being turn'd round towards the exterior Angle, to direct the *Pupilla* from thence, and alſo carried upwards, the whole Eye may be drawn beyond its *Orbit*: But if theſe two act together, they ſet the Eye tuberant towards the exterior Parts from the *Orbit*, and render it fit to ſee into all the fallacious Objects that are near it on each ſide: Laſtly, by making uſe of the Motions of the four former Muſcles, they make the Eye hang eaſily in the *Orbit.*

Furthermore, that the *Modus* and Place of Sight, or Viſion, may be determined to this known Structure of the Eye, all thoſe Things ſhou'd be apply'd which have been demonſtrated in *Opticks, Catoptricks,* and *Dioptricks,* which have been ſo much improv'd by Sir *Iſaac Newton,* who is a Man of ſo vaſt a Penetration, that he ſeems to have arrived to the utmoſt Perfection of human Wit, in Mathematicks and Philoſophy.

Light, of all collected aggregate Colours, turn'd every way emits the moſt ſubtil Rays, but ſuch as are compounded again, of all ſort of Colours, hence being diviſible again into ſimple ones; which by themſelves or variouſly collected make various Colours, but all united together, ones ſplendid, lucid Brightneſs, or ſhining white Colour; theſe Rays of Light from the lucid point as the Centre, poſited outwards towards all points, by right Lines, in a homogeneous *Medium,* without knowing any Interval of time, paſs thro' and becoming pellucid, ruſh into opack Objects; and therefore arrive alſo at all points of the *Cornea,* which are continu'd within the *Cone,* which is made in the lucid point, as the *Apex,* in the plane of the *Cornea,* as the *Baſis,* if ſhining between the Point and the *Cornea,* no Impediment interpoſes.

The ſame Rays approaching nearer to harder Bodies, being made curved from thence, ſome more, ſome leſs, are thus ſeparated; being ſeparated and reflected they produce various Colours, from a falſe, reflecting or repelling Body, except that they are ſeparated by its force; this various Reflexion therefore, according to the variety of Colour latent in the *Radius,* but yet in the Reflexion appears to be the ſame Angle of the reflexed and incident *Ray,* with the erect Perpendicular from the Place of Incidence, neither does there ſeem to be here made any change of the reſt.

But if thoſe Rays fall in from one *Medium* to another, they are afterwards curved about the approaching ones, foraſmuch as the like proceed by that *Medium*, from as much as the poſterior Body is denſer, the Rays are ſo much the greater towards the perpendicular, and ſo on the contrary; and alſo from a particular Cauſe latent here in ſome Fluids, tho' not determin'd by Experiments themſelves; and this Inclination is call'd *Refraction.*

But that is plain to the Senſes from this certain Law; the ſame *Radius*, if it hath fallen on the ſame pellucid *Medium* by various Angles, will be as the *Sinus* of the Angle inclining mutually to it ſelf, and ſo alſo the *Sinus* of the refracted Angles.

Hence therefore the Rays, from the ſhining or reflecting point to the pellucid *Cornea*, are diminiſh'd or leſſen'd by that means to the perpendicular, almoſt by the ſame Alteration of Courſe, as in the Water; ſo they proceed by the aqueous Humour, and are determined as they paſs by the *Foramen* of the *Pupilla*, on the Superficies of the Chryſtalline Humour, but thoſe which enter in by ſuch Obliquity, as they fall upon the *Iris*, from whence reflected they ſlip out of the Eye again, leaſt being reflected and entring the Eye together, they ſhou'd confuſe the Diſtinction of Sight. And there are others, which by their Obliquity flowing into the inferior *Uvea* and vitreous Body, or into the Superficies of the vitreous Body, are alſo ſo immediately ſuffocated in the black Colour there, as if there had been no Rays at all, ſo that no other can be tranſmitted thro' the vitreous Humour, except ſuch as penetrating the *Pupilla* fall into the Chryſtalline Humour: The *Iris* being in the mean time contracted or dilated, admits more or leſs Rays, according as the Object is livelier, or more languid, nearer or farther off: Whereby the luminous Object, conſtringing from thence the *Pupilla*, as the Object is nearer, the *Pupilla* is the more contracted, and ſo on the contrary wiſe, according to the former Deſcription of this Machine, which defends the tender *Retina*, leaſt it ſhould be injur'd, dry'd up, or conſumed with Heat.

The *Cornea* therefore as it hath a plainer Figure, compells the Rays as they paſs from one lucid Point; and ſo ſpreads them the more about, from whence fewer of 'em reach the Chryſtalline Humour, and thoſe that do are much divided, except they come from a pretty remote Object; but as that is rounder, it more unites the Rays as they paſs from one point, and by that means collects more of them in the Chryſtalline Humour, from whence may be underſtood one reaſon of the Sight of pore-blind and old People.

The Chryſtalline Humour collecting more determinate Rays, received from the *Pupilla* by a new Refraction, renders them converging, by which means, thoſe that ariſe from one point out of the Eye being here again, collected into one point not very diſtant, may be paſs'd thro' the *Vitreum* to the *Retina*, and there deſcribing that one ſingle point only preciſely, from whence thoſe Rays will follow; if the *Chryſtalline Lens* is too thick or round, then the Point of Collection being too near the Humour, there happens a Confuſion of Sight, if too lax or plain the remoter Point is ſtricken, from whence again proceeds Confuſion: And this is another Reaſon of the ſhort or diſtant Sightedneſs of ſuch as are *Pore-blind* or *Old*.

Therefore why *Pore-blinded* Perſons are aſſiſted by a hollow dioptick Glaſs, or the Nearneſs of the Object?

ject? And why old People ſee better from a Convex Dioptick Glaſs or the Diſtance of the Object, is plain from what hath been ſaid before? But theſe Vices are remedied, by the Adduction or bringing to of the Chryſtalline Humour to the *Cornea*, or removing of it from thence, which ſeems to be done by two different *Mediums*: To wit, by compreſſing the Bulb of the Eye by the four Muſcles contracted together, hence making it longer; or from the Contraction of the Fibres, compreſſing the *Vitreum* and raiſing the Chryſtalline Humour; neither does there any other Cauſe appear.

Refraction from the Air upon the *Cornea*, is almoſt equal to that, which is made from a Ray of Air, let fall upon the Water, which from the Aqueous Humour upon the *Lens* appears equal to that, which happens to the Ray, acting upon the *Vitreum* from the Water, from whence it alters little: Laſtly, that which is ſeen, while from the Chryſtalline Humour on the vitreous Body it changes but in a ſmall meaſure, and from the ſtricter Compreſſion of the vitreous Humour perhaps ſcarce differs, till that Body is made thicker, from whence there ſeems to be at firſt, that Neceſſity of the vitreous Humour, that the *Lens* being able to be moved freely or without Conſtraint, it may fitly accommodate the Eye for various diſtances; while at the ſame time that very Maſs of the Chryſtalline Humour is more conſtant to its Figure, than the vitreous Body.

From whence the whole *Apparatus* produces this, that in the bottom of the Eye, directly under the *Pupilla*, there is made a diſtinct and lively Collection of thoſe Rays, which proceeding on from one point of the Object, and entring into the Eye, penetrate the Chryſtalline Humour, and ſo ſtrike ſo many points on this bottom, as may be conſpicuous in the Image, from whence the like little Images from the Object are painted in the *Retina*.

For ſince the mucous *Medulla* of the optick Nerve, lodges preciſely in this Place, directly under the *Pupilla* and the Chryſtalline Humour, it is plain that is the Part, which receives the Pictures or Images, and brings them by a Continuation of this Impreſſion to the common Senſory, and excites or raiſes an *Idea* of the thing ſeen to the Mind.

Hence according to the Experiments of *Picard* and *Mariot*; we ought to praiſe that infinite Wiſdom, which hath placed the Ingreſs of the optick Sight, not in the *Axis*, neither towards the exterior Angle or corner of the Eye, but towards the Noſe in the middle Altitude.

Therefore the Perfection of Seeing depends on that Figure; the Pellucidneſs, Structure and Energy of the Solids, and on that Denſity or Thickneſs and Pellucidneſs of the Colourleſs Humours; from which many Rays from every viſible Point of the Object, mix'd with no others, are collected into one diſtinct point of the *Retina* made by this Heat, neither too diſtant, or too near; thence from the Motion of both thoſe, from the Objects clearly and diſtinctly placed in a various diſtance, it is equal in Diſtinction, for ſo Size, Figure, Diſtance, Situation, Motion, Reſt, Light and Colour are beſt repreſented; from whence that Situation is expreſs'd in the *Tunica Retina*, and that Expanſion and Proportion betwixt the Medullary, Arterial, Venous and Lymphatick Subſtance, which brings the pure Images freely thro' the optick Nerve to the common Senſory.

The Rays therefore ſhine, not from our ſelves, neither are they again reflected from the Objects into our ſelves, as the Stoicks aſſerted; neither do we ſee from a viſible Species ſent from the Objects into us, as the *Pythagoreans* ſaid; and ſcarcely from the *Effluvia*, emitted from the Object and the Eye, made before mutually embracing each other, and from thence reflecting, as the Platoniſts argued; and laſtly from no material Emanation of corporeal Images, as *Epicurus* thought; but from the Laws of Mechaniſm, as we have explain'd them in the human Body, to the better Underſtanding of which the curious *Jacob Raw* of *Amſterdam* hath much contributed by his accurate Deſcription of the inward Organ of the Eye.

Why do the Objects placed at the ſmalleſt diſtance, which the Eye can carry, that it may be diſtinctly ſeen, appear ſo clearly?

Why being remote they appear ſo diſtinctly at a great diſtance, tho' they ſeem weaker? Why do they look ſo confus'd? What is requiſite to a diſtinct, and what to a ſtrong Sight? *&c.* all theſe things are eaſy from what hath been ſaid.

Of Hearing.

SOund is a tremulous Motion of the common Air, ariſing from a ſonorous Body concuſſing it, by a reciprocal Shaking of its ſides. The Propagation thereof is made from the ſonorous Center, firſt of all, by right Lines in the Circumference of the Sphere of its Power; and by that Law making its Progreſs and Reflection, which it obtains in the Rays of Light; only that its Propagation is made ſucceſſively, to wit, it performs 968 Engliſh Feet in the compaſs of one Second of a Minute; leſs or more it is equally ſwift as it is ſpread abroad by a contrary Wind, which yet is leſs extended; it impreſſes its Tremblings from the elaſtick Bodies, but the elaſtick Bodies reflect or turn thoſe back ſcarce alter'd; but Hearing is the Perception of a Sound rais'd in the Mind, by the aſſiſtance of that Organ, call'd the Auditory Organ or Ear.

Hence therefore it is known, ſaith *Valſalva*, firſt that the ſmooth Membrane of the external Ear, firmly ſtretch'd upon the thin, elaſtick, tremulous

Cartilage, adhering to the cartilaginous *Baſis* of the *Os Temporum*, reflects ſtrongly, the ſonorous Rays received, neither ſtopping nor changing them.

But the Figure of the external Ear, hath ſeveral things worthy Obſervation in it; for the Eminence or Riſing thereof, ſaith the foreſaid Author, is remarkable, being placed above both the Temporal Bones, ſo that ſcarce any Rays of Sound can paſs by both Ears together. But the three ſpiral *Plicæ* or Foldings of the Ears, by their Fabrick, Poſition, Subordination, Inclination, Winding or Turning, make it from the ſonorous Point of the ſounding Rays ſent out, they are plentifully enough received and reflected back pure and uncorrupted from either or both Ears, but from thence being united together they are driven, ſaith *Duverney*, into the exterior *Concha* or Shell of the Ear.

But the opening Cavity of the *Concha* being elaſtick and free, is form'd with two Muſcles, by the Action of which, it is fitted to expand and yield to the various Motions received by it; ſo that being thus diſpos'd, it may be capable of uniting the Rays cloſe together, or diſperſing them wider, and conſequently accommodate it ſelf, ſo as to temper or allay ſtrong Sounds and increaſe the weak, as is moſt neceſſary.

But the Auditory *Meatus* or Paſſage, conſiſting, according to *Valſalva*, of a Tube partly cartilaginous, partly oſſeous, cloath'd with a like Membrane, by degrees finer and very nervous, being defended with a little viſcid Water and Ear-wax, trans-ſuding from the Glands ſeated underneath, being very fit for conveying the Sound unhurt towards the inward Parts; but the Obliquity of that increaſes the Superficies in this Canal, and multiplies the Places of their Reflections; alſo the cartilaginous, triangular Tongue being tremulous and erect in the hollow of the Ear, but eſpecially in the Orifice of the *Meatus*

Auditorius, from the Region placed before, furniſhed with a Muſcle, by an egregious Mechaniſm, makes it, that all the pure Rays are determined between the *Meatus*, neither do they iſſue forth however they are reflected : The Figure of it is tubulous, *cylindro*-elliptick, aſcending and deſcending by a Serpentine Progreſs, and by its Aſcent again terminating in the Membrane of the *Tympanum*, increaſes its Sound and Reflection, and makes it, that all the Rays run into the middle Center of its collected End, at the ſame time hindring its Clangor.

The Membrane of the *Tympanum* agreeable to *Duverney*, being ſupply'd with a threefold *Lamella*, ſaith *Ruyſch*, the middle of which is almoſt wholly vaſculous, the outward ones have ſcarce any Veſſels, ſo obliquely ſeated, that it inclines to the upper Parts of the *Meatus*, running out from the inferior, hence forming on the ſuperior Part an obtuſe, on the inferior an acute Angle with the *Meatus* ; ſo it more increaſes the Superficies, than if it was placed perpendicularly, hence it makes a larger Place for more Rays of Sound to flow in, and therefore it multiplies the tremulous Concuſſions ; but firſt it occaſions, that the Rays meet, eſpecially into the middle Center of this Membrane, that it may eaſier ſhake ; but ſince the exterior membranous *Lamina* are raiſed from the Auditory *Meatus*, from an intimate Membrane ſurrounding the *Tympanum* ; hence it is plain, that Membrane communicates the leſs, with the external and internal Ear.

Hence the ſtrict Application of this to the Border of the bony *Meatus*, the Thinneſs, Dryneſs, Looſeneſs thereof, the hollow Figure on the Part of the *Auditory Paſſage*, but *Convex* on the Part of the *Os petroſum*, the Application of the *Malleus* to this, teach us, that this Membrane ſtraitens the Ingreſs of Air, from the *Auditory Paſſage* into the internal Ear ; while the *Sordes*, excrementitious Humours, Inſects, Duſt and the like are invellop'd in the Ear-wax, and by the excited Motion of Titillation, firſt, from ſmall Hairs growing there evacuated; the ſonorous Motions are tranſmitted to the interior Parts; and perhaps here is ſomething perform'd of Dullneſs of Hearing.

Duverney ſays, the ſtrict or cloſe Application of the *Malleus* to the Membrane of the *Tympanum*, even almoſt to the Center thereof, with an extended Haft or Handle, while at the ſame time the moveable Head in the bony *Sinus*, and in the other Superficies of its Head, being furniſh'd with two Tubercles in each Cavity, is ſet together in the Articulation with the two Cavities, and one Eminence of the Body of the *Incus*, here ſuſpended at Liberty; the artificial Inſertion of three Muſcles into this *Malleus*; for firſt of all here is, according to *Aquapendent*, *Cowper*, *Bidloe* and *Caſſerius*, the external relaxing Muſcle of the Membrane of the *Tympanum*, which ariſing from a carneous Beginning out of the upper Part of the external Margin of the bony Auditory Paſſage, ending in a Tendon, running under the glandulous, ceruminous Membrane, it aſcends with its Tendon to the upper Parts of the Membrane of the *Tympanum*, where it paſſes by the *Sinus* left there in the Border of the oſſeous Ring, entring with its Tendon into the internal Shell, and deſcending even to the Tubercle of the *Malleus*, is there inſerted betwixt the ſinking and riſing *Apophyſis*; from whence it is evident from the Action thereof, that the *Malleus* and Membrane of the *Tympanum* are drawn towards the Auditory Paſſage, and from thence lead the Membrane to a level or evenneſs, and Extenſion; in the ſecond place, here is found the external Muſcle of *Duverney*, which ariſing tendinous from the external Part of *Euſtachius*'s Paſſage lying carneous thereto, aſcending upwards it enters the back Cavity of the *Tympanum*, form'd in the oblique *Sinus*, engrav'd upon the bony Margin of the

Membrane of the *Tympanum*, it inſerts it ſelf to the ſlender *Apophyſis* of the *Malleus*, eſpecially produced in the long, ſlender, flexible, elaſtick Proceſs, which *John Jacob Raw* hath diſcover'd here from his commendable Induſtry, and to which from the broad Application of the Fibres he hath taught, this Muſcle is united undoubtedly for an admirable Uſe, to wit, that from its innumerable Determinations, it might lead the thicker Part of the *Malleus* and the Membrane of the *Tympanum*, towards the Auditory Paſſage. 3ly, The internal Muſcle of *Euſtachius* is diſcover'd by *Duverney* and *Valſalva*, which ariſing with its Fibres from the foreſide of the Cartilage of *Euſtachius*'s Paſſage, thence contain'd in the *oſſeous Semi-canal*, running out laterally at the ſuperior Part of *Euſtachius*'s Paſſage, leaving that with its Tendon emerging near the oval *Feneſtra*, reflected as it were about the bony *Trochlea* or Cavity of the Ear, it is inſerted to the *Malleus* of the ſame, at the back part under the Inſertion of the external Muſcle of the *Malleus*, by the help of this Muſcle being contracted, the *Malleus* is drawn, and the Membrane of the *Tympanum*, ſtretch'd towards the *Os petroſum*, and the concave Membrane reſtored; I ſay, all theſe things teach us, that the *Malleus* as a *Leaver* apply'd to the Membrane of the *Tympanum*, in the moment of Motion, reſting or leaning upon the *Sinus* of the hollow'd Margin, as on a fix'd *Baſis*, to ſuſtain its Rotation, ſtretch'd by the aſſiſtance of one, two or three Muſcles, may firſt extend or remit the Membrane of the *Tympanum*, render it convex, or make it plain, direct or drive it different ways, hold it ſuſpended, thro' various Degrees and various Directions. 2ly, For this reaſon it may alter the ſpace of the internal Cavity of the Ear to draw in, expell and compreſs the Air, juſt as the Paſſage of *Euſtachius* is open or ſhut. 3ly, Hence the Membrane of the *Tympanum* is adapted for the Reception of the harmonious Concuſſion of Sounds, communicated from tenſe Bodies, and eaſily beſtow'd upon the *Incus*, as Mathematicks teach us.

The Body of the *Incus*, ſaith *Duverney*, articulated with the *Malleus*, reſting on the *oſſeous Sinus* at the *Malleus*; and free Suſpenſion of its ſhort Proceſs from the ſuſpenſory Ligament, in the upper poſterior Cavity of the *Concha* or Shell; the Connexion of its longer Proceſs, with the little orbicular Bone; the Articulation of this with the tip thereof in the hollow of the *Stapes* or *Stirrup*; the Uniting of the Elliptick Baſis of the *Stapes* with the Membrane of the *Foramen ovale* demonſtrate, that the Concuſſions impreſs'd on the ſonorous Membrane, by the help of the four little Bones, cover'd with their vaſculous *Perioſteums*, according to *Ruyſch*, and joyn'd together by Articulations, ſaith *Valſalva*, ſuſpended or hung at liberty in the great hollow of the *Concha* agreeable to *Duverney*, conſtantly lubricated with an exſuding Humour, by which means Sounds may be communicated without Injury even to the Membrane of the *Foramen ovale*, and be impreſs'd thereon as ſuch.

By this notable Artifice again, the *Stapes* may be ſtretch'd here, and the Membrane of the *Foramen ovale*, by the aſſiſtance of the Muſcle of the *Stapes*; which is raiſed from a carneous Body from the oſſeous Canal, ſtampt on the *Os petroſum* at the bottom of the *Tympanum*, thence deſcending by a fine ſlender Tendon, it is knit to the Head of the *Stapes*, and by drawing obliquely, it depreſſes one and raiſes the oppoſite Part of that little Membrane.

Therefore Sounds unhurt and unchang'd, belong to this Membrane, but yet may be from this *Apparatus* extended to infinite degrees; hence therefore it is ſo apt to receive ſuch an infinite diverſity of Concuſſions, that contrariwiſe make the like

Vibrations; and communicates them as ſuch to the hollow of the Labyrinth, which being ſhut, covers the *Oval Entry* or Window.

The broad internal *Concha* or Shell, like an Elliptick Body communicating into the cellulous Cavities of the *Maſtoide* Proceſs; by *Euſtachius*'s Tube, partly bony, partly cartilaginous, gaping with an open Mouth towards the Palate, being ſhut by a cartilaginous ſemilunar Margin, having a Communication with the external Air, which is drawn in from the Noſtrils or Mouth, makes it, that firſt, the Air can go this way into theſe Places, there to remain, be rarefy'd, paſs'd out, renew'd and compreſs'd: 2ly, That it can be ſo reduced to a Temperament with the external Air. 3ly, That the ſonorous Rays admitted thro' the Noſe or Mouth, entring in hither, may expedite or aſſiſt the Hearing, when the *Auditory Meatus* is hurt or injured. 4ly, Becauſe all thoſe Places may be inveſted or cloth'd with a vaſculous Membrane, here is a ſoft, lubricated Texture of Parts, that the Expurgation of all thoſe Contents may be preſerved.

But while the round *Foramen*, ſaith *Duverney*, being ſhut by a thin tenſe Membrane, lying open into one part of the Scale of the *Cochlea*; as it were in the Pan or Socket of this elliptick Space, placed in a contrary Center to the Membrane of the *Tympanum*, it forces thoſe ſonorous Rays into this Membrane: To move the Cavity of the Scale, and the Contents thereof, by communicating the airy Tremors or Concuſſions, yet perhaps not ſo accurately and diſtinctly as thoſe are, which by the Help of the Membrane of the *Tympanum*, and the little Bones are impreſs'd on the Membrane of the *Foramen ovale*.

Whether the *Meatus* or Paſſage of *Euſtachius*, be opened by the Action of the internal Muſcle at the ſame time, in which from the Application of the Membrane of the *Tympanum* in this Operation, the Cavity of the interior Shell is ſhut? Whether the Mouth thereof about the Palate be ſhut, from the drawing in of the cartilaginous Valve by the Contraction of the Muſcle *Cephalo-pharyngeus*, hindring the Entrance thus far of the Aliment in ſwallowing.

But notwithſtanding *Duverney*'s *Foramen ovale* opens into the hollow *Veſtibulum*, or Entrance being fill'd, partly from the medullary Portion of the Nerves, which entring the *Forameu* from the Auditory Nerve by the internal Superficies of the *Os petroſum*, brought to by the ſmalleſt Holes made in the *Veſtibulum*, being there diſtributed, diſpos'd and confirm'd by three ſemicircular bony Canals, and as is obſerved again, they are ſeen to go out medullous; partly from the medullary Portion of a ſoft Nerve out of the foreſaid *Foramen*, entring the *Apex* or very tip of the *Cochlea* by many ſmall Holes, and from thence diſtributing little Filaments or Threads by the upper ſpiral Paſſage, from whence beſtowing the ſoft Pulp on the *Veſtibulum* under the oval Membrane; I ſay, it appears from theſe, that the ſonorous Rays by this ſhaking Membrane, are carried together with the Help of thoſe concuſſing Nerves, to the common Senſory, and there raiſe the *Idea* of Sound.

But the Fabrick of the ſpiral Cavity of the Ear call'd the *Cochlea*, ſeems form'd beyond all Admiration; while undoubtedly the oſſeous Canal being conick, is bounded about the bony *Cone* from the *Baſis* thereof upwards from its *Baſis* with two perfect ſpiral Windings, with one half from its tip to the tip of the *Cone*, being in the *interim*, every where divided from the *Baſis* to the tip, even thro' the triangular *Septum Medium*, accurately into two ſeparate equal Parts; which *Septum*, in the neareſt Part ſuſtaining the Cone, is oſſeous, ſmooth, tremulous and elaſtick in the outward Part, in reſpect to the

Strength of the Cone membranous and nervous, partly fixed to the preceding bony Part, partly to the bony Canal; ſo that theſe two Paſſages communicate nothing, nay the Mouth of the Superior lies open into the *Veſtibulum*, but that of the Inferior is ſhut by the Membrane of the round *Foramen*; while in the mean time the little ſlender Nerves are ſeen every repairing to this Place.

For by this Artifice it is brought to paſs, that in this *Lamella*, from the determinate *Baſis* ending in a point: infinite tremulous Cords equally ſtretch'd, may be diſtributed; and therefore there are always amongſt them innumerable quantities, which tremble or ſhake in an harmonious Conſent with every Sound, and from thence may repreſent that, and can bring it as ſuch to the common Senſory; for which reaſon therefore that acute Diſtinction of different Sounds, is perform'd by the Help of the oval Membrane, while from the Motion of the round Membrane, there is a ſimple Perception as it were only of a murmuring or humming Noiſe communicated which excites Attention, and in the ſame manner likewiſe ſtretches the bony Organs, as they are fitted to that which is heard by diſtinguiſhing.

But whether the extreme Filaments of thoſe ſmall Nerves exerciſing their Office or Function, and being diſtributed by theſe Labyrinths, return again into the *Cerebrum*, and ſo to the common Senſory? Certainly there are infinite Numbers of Queſtions remain to be inquired into.

As, why the Hearing is quicken'd by applying the Hand to the hollow of the Auricle, towards the Sound; and why on the contrary, when the Auricles are cut off, the Hearing is dull?

Why is the Hearing increas'd if the Plane of the Ear be turned from the Sound, to the Obliquity of Forty Five Degrees.

Why is the Hearing clearer upon the Mouth being open, and the lower Jaw hanging?

In crying, yawning, quick ſpeaking or ſinging, why is there a Noiſe in the Ear and a Dulneſs of Hearing?

Why do deaf Perſons, holding a creaking Body, in their Teeth, perceive the Noiſe it makes?

Why do they often hear better by ſpeaking into their Mouths?

Why is there Deafneſs, if the opening of *Euſtachius Tube* be any ways obſtructed? Why the ſame from the Membrane of the *Tympanum* being broken?

What way do ſome emit the Fumes drawn in at the Mouth into the Ears?

Whence is it that in two Ears, there is but one ſound, and that without Confuſion? All theſe things may be found reſolved in *Bartholomæus Euſtachius*, *Julius Caſſerius*, *Fab. Aquapendent*, *Shelhamer*, *Duverney* and *Valſalva.*

Of the internal Senſes.

FRom all theſe things we know, that our Bodies receive nothing elſe from ſenſible Objects, that may make the Senſes, than an Alteration excited in the Superficies of the Nerve by the Touch of the Object moved; which is produced from the Figure, Size, Hardneſs and Motion of the ſenſible Body changed; ſo that it is probable, that the moſt different ſenſible Bodies if they were the ſame in theſe Four, they would raiſe the ſame Senſe in the ſame Organ.

Neither is this ſufficient; but it is requiſite that that Change be propagated by an unconſtrain'd Nerve, even to ſome Place in the *Medulla* of the

Cerebrum, from a ſingle Nerve alſo into a particular Portion of the *Cerebrous Medulla*; which we are taught is ſo from Ligatures, Wounds and Corruptions of the Nerves of the Brain. But this Change is received there ſo ſmall and that ſo ſimple, that nothing ſcarce is ſimpler; and certainly without that Simplicity it can ſcarce be examined or explain'd.

But in the mean while, according to the Variety of the Object, the Diverſity of the Nerve affected; the Diſtinction of the fabricated Organ of Senſe, according to the Variation of the Place in the *Medulla* of the Brain, from whence that Nerve proceeds, the different degree of Motion, by which the Action of the Object is apply'd; there ariſes in the diſcerning Intellect, an *Idea* perceiving variouſly and repreſenting nothing that is in the Action of the Object, or in the Paſſion of the Organ; but yet the ſame *Idea* always follows the ſame Action of the ſame Object into the ſame Organ; from whence the Connexion of thoſe *Idea's* follows the ſame Diſpoſition of the ſaid diſcerning Organ, as if the conceived *Idea* had been the effect of the Action of the Object upon the Organ.

Therefore this Diverſity of *Idea's* does not ſeem to depend only from that Variety, from which the extreme Part of the Nerve is made; but from many others beſides, not indeed Cauſes, but Conditions from the Inſtitutions of the adorable Creator.

The *Idea's* oftentimes while they are perceived in the Intellect, likewiſe raiſe in this Repreſentation Joy or Sorrow, or neither; theſe Indifferents produce Love or Hatred towards that Object, from the Action of which that *Idea* was excited.

But we are ſo form'd, that this very Condition of the Mind of Love or Hatred, ſtirs up in the Body ſuch like muſcular Motions, by the aſſiſtance of which the Object of Joy can be united to the Body or the Thought, or whoſe Efficacy can remove that ſo, that the Sorrow attending the Preſence of it may be blotted out.

But ſince thoſe muſcular Motions, by the Help of the Spirits puls'd from the Brain into the Muſcles are perform'd, hence it is plain that from every Point of this to the very Muſcles obnoxious to the Will,there is a free uninterrupted Motion of the Spirits ariſing from the Brain ; from whence the common Senſory is part of the Brain, where all thoſe collected Points meet together ; and therefore it is evidently the *Medulla* of the Brain in the Head.

As the Action of the Object is more diſtinct in the common Senſory, the *Idea* ariſing from thence is clearer and diſtincter.

By how much the Action of the Object is livelier in the common Senſory, the *Idea* rais'd from thence is the clearer.

The oft'ner the Action of the Object is renewed in the common Senſory, the *Idea* from thence is the brighter.

The more foreign the Action of the Object is from all others in the common Senſory, and by how much the more unuſed, by that means the *Idea* becomes more lively.

If therefore the Condition impreſs'd from the common Senſory, ſo ſtrongly adheres, that it cannot be chang'd from the ſupervening Action of other Objects, the preſent *Idea* will remain as the Companion of that Condition. Or at leaſt from the Occaſion of the Cauſe or acceſſary *Idea*, the ſame *Idea* is reſtored to the Will ; but if the like Conſcience of what was formerly conceiv'd attend, it is call'd *Memory.*

But all this depends only on that ſimple Condition of the common Senſory, which is there only a mere mechanical Diſpoſition.

Wherefore it may ariſe equally from corporeal Cauſes in the Body, whereſoever latent, affecting after that manner the Nerves, Spirits and Brain, hence exciting the ſame *Idea's*; and this Diſpoſition is call'd the firſt Imagination.

If then the Memory of ſuch an *Idea*, acting by reaſon of ſome external Object formerly raiſed, be ſo ſtrong, and alſo the preſent *Idea* now depending on the internal *διάθεσις* be ſo lively, it is the ſtrongeſt Argument that the preſent Cauſe of this is now out of the Body, which is called the ſecond Imagination.

If the Will in the common Senſory, and in the Parts efficaciouſly cohering to it, retains that Condition, which ariſes from the Action of a diſtinct and lively Object; or if it ſtops the Actions of all the other Objects,and keeps only the former, this Action of it is call'd *Attention*; from the effect of which, there is a diſtinct, clear and ſprightly *Idea* that laſts long, and therefore may be call'd the Mother of *Science*.

From which are underſtood both thoſe, commonly call'd the five external Senſes, as alſo thoſe internal ones, nam'd the *Memory*, *Imagination*, the *Affections of the Mind*, *Attention*; with which, *Hunger* and *Thirſt* us'd to be reckon'd by ſome; from whence alſo, may be known the reaſon of many Enquiries about this Affair; as,

Firſt, Why Corporeal Signs, having nothing beſides the Will of the Inſtitutor, ſo produce, direct, and change *Idea's*?

Why it is impoſſible to correct a ſecond Imagination by any reaſon, but with violent Motion?

Why, one with another, the external and internal Senſes flouriſh, voluntary and muſcular Motion ceaſing?

Why Attention, Remembrance and Imagination lull aſleep the external Senſes, and ſuppreſs the Motions of the Body?

From what reaſon does ſuch Weakneſs happen to the Body, where the internal Senſes are vigorouſly and long exercis'd?

But from what reaſon do various Objects ſo often exhilarate?

Why do Meat and Drink, Medicines, Poiſon, Reſt, Motion, Air, Heat, Cold, Cuſtom, Affections of the Mind, perform ſuch Power in all this?

Of Waking or Abſence from Sleep.

THat Perſon is call'd Waking, in whom the Organs of external and internal Senſe, as well as the Inſtruments of voluntary and involuntary Motions are in ſuch a Diſpoſition, that they can eaſily exerciſe their uſual Motions: Which wholly depends on the Preſence of the Spirits that are good and plentiful, in the Brain, its *Medulla*, Nerves and Muſcles, as alſo on the good Condition of the ſolid Parts conſtituting the Brain, Nerves and Muſcles. Therefore Waking is ſaid to be that State of the Body, in which theſe two are in this Condition.

Of Sleep.

BUT the Knowledge of *Sleep* is much more obſcure, tho' it is only the oppoſite State to Waking, from whence there will be occaſion, towards the underſtanding of its Nature, accurately to weigh all its *Phænomena*, which are theſe.

Firſt, Falling from Waking into Sleep, they begin to be ſeiz'd by degrees, and exerciſe all their Senſes external and internal with Difficulty, and alſo with a Senſe of Weight in the Body, and at laſt they reſt altogether.

2ly, They begin to reſt by degrees, from thence to ceaſe with a Senſe of great Reſiſtance, to give over all voluntary Motion.

3ly, But the Muſcles appointed for exerciſing or performing theſe, fall, flag, decay, and grow paralytick; firſt of all, appearing in the Eye-lids, Face, Neck and Arms, and ſo by degrees extend over the whole Body.

4ly, All theſe corporeal Effects, and the Affections of the Mind ceaſe, which are ſucceeded from theſe Three, as from a Cauſe.

5ly, Yet in the *interim*, the Motion of the Arteries, Veins and Heart, is ſtronger, ſlower, more equal and fuller, increaſing thro' various degrees, as Sleep comes on.

6ly, Reſpiration is deeper, ſtronger, ſlower, equaller, coming on gradually, and growing greater as Sleep increaſes.

7ly, All thoſe things therefore, which are made from theſe Two are perfectly perform'd; from whence is brought about that Perfection to the Blood, which is required to the beſt Circulation, Concoction, Secretion, Perſpiration, Diſtribution and Nutrition; and makes firſt, the Motion of the Humours quicker thro' the ſanguiferous Veſſels and near to the Heart, but ſlower at a diſtance therefrom, and otherwiſe excited thro' the voluntary Muſcles.

8ly, The ſleeping Man wakes from the external Senſe, being very much ſtirr'd up by the Object, or from an inconvenient Perception of Pain, or from a Diſturbance occaſion'd by too great a Compreſſion of the Part, or elſe of his own accord; otherwiſe the more any one ſleeps, the more ſleepy they will be, till at laſt Life becomes one intire Sleep.

9ly, The waking Man firſt looſ'd from Sleep, opens his Eye-lids, ſtretches his Limbs, yawns and returns to Reſt awhile, till being refreſh'd, he recovers his Strength again.

But Sleep is procured, cheriſh'd and increas'd in us; firſt, by ſolid and tenacious Food, too much eating, and Stoppage in the Stomach.

2ly, From too plentiful Drinking of vegetable fermenting Liquors, being the more ſomniferous, as they abound more in Spirits.

3ly, From penetrating, flagrant, ſpirituous Aromaticks, from Saffron, Clary, Sage and the like, in which there is no obſtructing Acrimony.

4ly, From Poppy, Hounds-tongue and Lettice-juice, the Mandrake Apple, and the Virtue of Nightſhade.

5ly, From a great Weérineſs, by a long continuance of Labour.

6ly, From the Quiet of a contented Mind, and a lazy Tranquility of an unactive Body, and an abſolute Retirement from all ſenſible Objects.

7ly, From Exceſs of Heat or Cold, or it proceeds from ſome common Cauſe, whether from Temperature or Age.

8ly, From every ſuch Cauſe which hinders the Arrival of the vital Blood into the *Cortex* of the Brain, and its Paſſage thro' the Veſſels thereof, the Secretion of the Spirits ſo neceſſary for that Uſe; the Derivation of them into the Nerves, the Organs of the Senſes, and the voluntary Muſcles; the Reflux of thoſe Spirits from all theſe Places, towards the common Senſory; hence comes Two Evacuations, apituitous Diſpoſition of the Humours, a Plethora that is urging, Wounds of the Brain with a Phlegmon of it, Apoſtems produced there, Extravaſation of Humours under the *Cranium*, Contuſion of the Brain, its Compreſſion, Ablation, Putrefaction, and many others of the like nature.

In the next place, *Sleep* is diſturb'd, firſt from a perpetual, ſlow Mixture of a wat'ry or warm Liquor with the Blood.

2ly, From a Vellication of the cerebrous Nerves, by ſome Acrid.

3ly, From a ſtrong Affection of the Mind.

4ly, From the Brain being irritated by ſome external or internal Cauſe.

Therefore *Sleep* will be that State of the *Medulla* of the Brain, in which the *Nerves* receive not from the Brain, either ſo plentiful or ſo ſtrong an Influx of Spirits, as is required from thence, that the Organs of the Senſes and thoſe of voluntary Motion may eaſily and expeditiouſly perform their Actions.

But the proximate Cauſe of this is perhaps the penury of a ſubtil Spirit, elaborated only with much more Eaſe and Quiet, and ſo waſted or conſumed upon the Parts; from whence the little empty Veſſels for a time flag and are ſcarce inflated; or there is ſuch a Preſſure of the groſſer Blood at the *Cortex* of the Brain, that hence the *Medulla* wrapt round by the *Cortex*, wants compreſſing to aſſiſt the Paſſage of the Spirits.

And the natural Cauſe of *Sleep* is every thing that can produce theſe two: From whence the Effects thereof are underſtood; for in *Sleep* ſome Actions ceaſe, the Organs of theſe and the Muſcles are at reſt; the Spirits ſcarce flow thro' them, therefore they are leſs conſumed or waſted; but the ſolid *Villi* and Fibres in the Nerves and Muſcles are ſcarce chang'd; it obtains an *Æquilibrium* in all the Parts; neither is there a variety of Preſſure in the Veſſels, or that Diverſity of Swiftneſs in the Humours.

But in *Sleep* the Motion of the *Heart*, *Lungs*, *Arteries* and *Viſcera* is increas'd; neither is it here ſo alter'd or deſtroy'd, by the Action of the Senſes or voluntary Motions then ceaſing: Therefore theſe Effects are produced, which depend immediately of them, and may be judg'd: 1ſt, The ſtronger and more equal Circulation of the Vital Humours, thro'

Canals then more free and lax, lying open to the Ingreſs thereof, not impeded by the variety of the Muſcles; hence the Impulſe is indeed leſs into the lateral Veſſels, but more equal and forcible thro' the larger, therefore the lateral Pipes are fill'd by degrees, paſſing leſs thro' them, till at laſt they are almoſt at Reſt; the little adipous Bags are fill'd with a gummy Oil, and diſtended as thoſe of the Glands; hence the Circulation becoming ſenſibly ſlower thro' the ſanguiferous Veſſels, at laſt is ſcarce obſervable if too long protracted; while in the mean time, the accumulated Fat as a Balſam ſpread around, defends the inward Contents, and ſlowly by urgent Neceſſity affords a ſmall Quantity of *Pabulum* or Suſtenance. 2ly, From whence in moderate Sleep, how excellently are the Materials of *Chyle* chang'd into *Serum*, that in thinner Humours, and thoſe again into Nutriment. 3ly, The Exerciſe of the Parts cohering in the Solids grow by degrees ſlower. 4ly, The Secretion upon the Skin increaſes, the reſt becoming leſs. 5ly, The beſt Recovery of what is loſt, for an equal, continual Repletion, reſtores the Fluids, and is the beſt way of repairing the Solids; becauſe the impeding, troubleſome and deſtructive Cauſes are at reſt: While in the interim, the matter is happily made red, there is a Fitneſs in the Veſſels, for Reception and Readineſs to enter the Humours, and in the mean while, the Cauſes applying and conſolidating Act freely. Hence therefore there is a new Production and Accumulation of Animal Spirits, as to matter throughout all the Humours, and as to Repletion in the ſmalleſt Veſſels.

Being thus refreſh'd and comforted by Sleep, there is an Aptitude or Inclination in the Body to waking again, and an Unaptneſs for Sleep; from whence being ſtirr'd up from an accidental Cauſe the Man wakes again.

Why, with a hot Head and cold Feet we wake and cannot ſleep?

Why does Drunkenneſs proceed from ſpirituous Things, and afterwards Sleep?

Whence come Dreams? And Whence Motion in thoſe that dream?

In Sleep laudably taken not exceeding eight Hours, why is the Perſpiration doubly greater, than it wou'd have been, in the ſame time waking?

How comes it that in ſleeping too long, the Head is heavy, the Senſes dull; the Memory weak; we perceive cold, Fatneſs, weight a Suffocation of Strength, the Muſcles are unfit for Motion, and there is a Remiſſion of Perſpiration.

Whence does a continued Protraction of Sleep ſupport Life a great while without Meat or Drink?

How comes it that from hearty or ſound Sleep, Expanſion of all the Muſcles, repeated Yawnings, Sharpneſs of Judgment, Agility to the Muſcles, and Strength to the Nerves, are always reſtored?

From what Effect do the *Fœtus*'s in the Womb always ſleep, Children frequently, and Youth more abundantly than Adults, or old Men?

And of what ſervice is it, that ſuch as are recovered lately from the moſt dangerous Diſeaſes, ſleep much longer than when they were perfectly well?

But the Reaſon, from whence the Muſcles of the Heart ſuffer, not ſo much in time of Sleep, but on the contrary act otherwiſe ſtronger, ſeems to be underſtood if we have regard; 1ſt, to the Difference of the Brain's Softneſs, being made up of Cavities, girt in and compreſs'd with ſtrong venous *Sinuſſes* that are expanſive, and crown'd with great external arterial Circles; and to the difference of the ſolider more compact *Cerebellum*, deſtitute of any hollow, neither bound in or compreſs'd with any Venous *Sinus*, not expanſive or compreſſile, but only ſupplyed with Arteries and Veins. 2ly, Cardiack

Nerves that owe their Origin only to the *Cerebellum.* 3ly, Coronary Arteries that are fill'd and emptied at contrary times, according to the reſt of the whole Body. 4ly, The Cavities of the Heart are fill'd at the ſame time with the *Coronaries.* 5ly, The Auricles and Cavities of the Heart are fill'd and emptied in Motion, and at Reſt alternately; for from all theſe it is plain, the Reaſon of the Hearts Contraction is conſtantly renew'd, acts again, periſheth, or is at Quiet.

Of Reſpiration.

WHat Reſpiration is, and why it laſts without the Aſſiſtance of the Mind, will appear from what follows: For Order requires that we ſearch it out; and this Action not being frequently ſeen, is therefore hard to underſtand; 1ſt, becauſe it is partly vital, and partly voluntary, as alſo, becauſe ſo many Organs are uſed for the Performance thereof; wherefore it will be diligently enquired into, which may be moſt conveniently done by conſidering the *Phænomena* and Organs of Reſpiration.

The *Lungs* are ſuſpended in Air, which hath free Acceſs to them on every ſide, being equally preſs'd thereby, they fall together and contract themſelves into leſſer ſpace, becoming much leſs than they were, while they hung intire in the *Thorax,* that Anatomy teaches: This Strength or Energy is diſcharg'd, firſt of all, by the contractile Action of the Muſcular Fibres, and the ſquammous Segments of the *Bronchia.*

The *Lungs* thus contracted, if they are fill'd with Air, blown into them thro' the *Glottis*; they diſtend from thence ſo far, that they take up the ſame Magnitude that they poſſeſs'd before in the *Thorax,* nay, they exceed that Number in ſpace, as Experience informs us.

From whence it appears the *Lungs* always labour by their proper force, that they become leſs in all their Parts which happens ſo, while they are placed in the confined *Thorax*, hence they are always in a State of violent Contraction while the Man lives, and therefore cloſe together and are leſſen'd, while the intire *Animal* remains in *Boyle*'s *Vacuum*.

On the other ſide, that it is not Air like that of the Ambient, betwixt the external Membrane of the *Lungs* and the *Pleura*, in all its Circuit in a healthful Man; therefore there is nothing that compreſſes externally the *Lungs*, but the *Diaphragm*; in the mean while, the Air always freely entring by the *Glottis*, is always there internally; from whence the *Lungs* is always little more extended by the internal Air, then it is compreſs'd by the external Air, hindred from the *Diaphragm*, being ſo knit to the Ribs and *Vertebræ*, that it cannot enter into the *Thorax* as is required, to make a balance.

Anatomy evidently demonſtrates this Truth to be of great moment in theſe things; the Production and Increaſe of the *Fœtus* in the Womb, and the Man out of the Womb, the Inflation of the *Lungs*; wounds penetrating the Cavity of the *Thorax*, procuring a Decay of the *Lungs*, and impeding the Dilatation thereof, ſometimes inflicted on one, and then on both ſides of the Breaſt; but eſpecially the celebrated Experiment of *Hook*'s perform'd on live Dogs.

Therefore ſince in a larger Inſpiration the Air, which before enter'd plentifully by the *Glottis* into the *Lungs*, extended them the more, it will overcome the natural Strength of them, therefore the *Lungs* ſuffers in this Action; but what they do, the *Phænomena* teach us.

In a Vital Inſpiration, beheld firſt in a ſleeping Man; the Nine Superior Ribs ſticking in the Articulation to the *Vertebræ*, and in the Union with the Cartilages growing to the *Sternum*, ariſe with the arched Part ſo towards the Clavicles, that the Motion is chiefly obſerved here in the middle of the Arch; but the three or perhaps four Inferior Ribs are turn'd out, downward and backward a little oblique; but yet ſo, that the Seventh, Eighth, Ninth and Tenth Ribs, with their cartilaginous Segments are drawn together, as it were inwards. 2ly, It alſo ſwells the whole *Abdomen* more and more by degrees, even to the End of the Inſpiration, and ſqueezes it very much outward. 3ly, But at the ſame time the Capacity of the *Thorax* is inlarged, as the putting a Girdle round the Waſte, and the Eye it ſelf diſcovers, and eſpecially, the Mechanical Contemplation of the Figure, Situation, Connexion and Articulation, poſited with the greateſt Art, concerning which, conſult the Demonſtrations of *Borellus*.

But in that very Action the *Diaphragm*, from its convex and ſinous Poſition which it had before, is brought into a Figure that is almoſt plain towards the lower Parts; for this, the Inciſion of live Brutes, the large Wounds of the Belly in them teach us; for that Change or Alteration of Figure depends on the Contraction of the muſculous Structure in this *Septum*, as Anatomical Inquiry informs us.

Since therefore they are not otherwiſe in Inſpiration, the Cauſe thereof will be determined by theſe things; to wit, the deſcrib'd Motion of the Ribs and *Diaphragm*, wherefore we are to inquire into thoſe Cauſes which produce ſuch Motions.

The Ten upper bony Ribs ſaith *Veſalius*, are arch'd or curved, and in the middle much more depreſs'd, than in the extream riſing Parts; being articulated in both their *Apophyſis*, furniſh'd with a Cartilage.

Firſt, In the cartilaginous Socket or Trench being imprinted with Bodies united laterally backward, or in the ſole Body of the firſt *Vertebræ.* 2ly, In the cartilaginous *Sinus* ingraved in the tranſverſe Proceſs of the *Vertebræ*; they are joyn'd together by an arched cartilaginous Segment very elaſtick, to an obtuſe Angle upwards; that Segment from thence aſcending enters into the lateral Cavities of the *Sternum* ſo, that as the Superior Rib, ſo the Angle of this Inſertion is leſs at the meeting of the upper Part of the *Sternum.* The two lower Ribs, ſometimes three being ſupply'd with one poſtick *Apophyſis*, are articulated only to one *Sinus* in the very Body of its ſingle *Vertebræ*, and with its Cartilages that are almoſt only tendinous, they reach not the *Sternum*, but being inſerted to the *Diaphragm* and Cartilages of the next Ribs, diſappear.

The Intercoſtal Muſcles, that are external according to *Veſalius*, ariſing from the inferior Margin of the upper Rib, deſcend obliquely forward, and are inſerted to the upper Margin of the Rib following beneath, with an intire oſſeous Circumference, but the internal Intercoſtals ariſing from the lower Margin of the Superior Rib, deſcending obliquely backward, cutting croſs the former are inſerted to the upper Margin of the Rib following beneath it, with an intire bony Circumference.

But the Subclavian Muſcle, ſaith *Spigelius*, from the lower half Part of the Clavicle, where it is joyn'd to the Spine of the *Scapula* ariſing carneous, goes obliquely forward to the upper Margin of the firſt Rib, inſerted near the *Sternum.*

Therefore if theſe Muſcles are contracted or drawn together; then the firſt Rib by its proper Articulation is faſtned ſufficiently ſtrong, by the force of the ſubclavian the nine following Ribs are rais'd upwards, and turn'd outwards, firſt in the middle Arches, yet ſo that they continue in an equal *Paralleliſm*, depreſſing the cartilaginous Segments which are very much reſiſted, ſo that the Capacity or Breadth of the *Thorax* or Cheſt is ſufficiently enlarg'd.

The *Diaphragm* as deſcrib'd being contracted makes a plane or even Superficies; it ſtrongly dilates the *Thorax*, conſtringes the *Abdomen*; conducts the anterior Cartilages of the Baſtard Ribs inwards towards the *Vertebræ*, in ſome meaſure draws the two lower Baſtard Ribs downwards, and diſtends the Abdominal Muſcles.

And theſe ſeem to be the only Muſcles, which perform Vital Inſpiration; the Intercoſtal receiving Nerves, ſaith *Vieuſſens*, from the Dorſal Muſcles, and the *Diaphragm*, according to *Willis*, from thoſe of the *Vertebræ*.

Therefore from the enlarg'd Capacity of the *Thorax*, betwixt the *Pleura* and the Superficies of the *Lungs*, nothing preſſing them, it follows the Air entring therein, is breath'd by the *Glottis*, till they are the ſame again, or rather continue accurately contiguous to the *Pleura*, and for this reaſon produce all thoſe Things which are ſaid.

From theſe remaining thus, the Air moves or acts upon the Lungs, with the ſame or equal Force as the *Thorax* reſiſts it, therefore the *Lungs* are at reſt, hence leſs Blood will paſs thro', it will be moved in leſs Quantity into the left *Ventricle* of the Heart, and ſo leſs into the *Cerebellum* and its Nerves: Then leaſt Arterial Blood will be thrown into the Intercoſtal Muſcles and *Diaphragm*, therefore the dilating Cauſes debilitate or weaken the *Thorax*, hence the Spring of the cartilaginous Segments depreſſes the Ribs again, from the aſſiſting muſcular Fibres, as *Bidloo* ſaith, ariſing from the ſide of the *Sternum*, within the *Thorax*, and from the oſſeous End, and alſo inſerted into the Cartilage of the true Ribs; then the diſtracted Fibres, or thoſe that are ſeparated and drawn aſunder of the *Peritonæum* and *Abdominal* Muſcles returning to themſelves again, hence the *Viſcera* compreſſing, thruſts the lax *Diaphragm* upwards into the *Thorax*; the Breaſt is then conſtring'd, the Air expell'd from the *Lungs*: Expiration is made, and all Things done, as were ſaid; but in the firſt Place, the Paſſage of the Blood thro' the *Lungs* is accelerated and performed by theſe two Actions.

Hence, in this very moment the Blood being quicken'd again, begins to flow ſtronger and more plentifully to the *Cerebellum* and the Muſcles; therefore the contracting Cauſes recruit the Intercoſtals and *Diaphragm*, Inſpiration is renewed; and ſo there is aſſign'd a true, preſent and ſufficient Reaſon, for this alternate vital Motion.

But beſides theſe Cauſes of vital Inſpiration, there are others happen which ſerve the Will, and alſo cleave to, or are apply'd to the Ribs, for the violent Dilatation of the Breaſt, and its ſtrong Conſtriction. The former tho' they ſerve for other Functions, yet they operate here, while they are thus determined or appointed for this Office. For the firſt *Scalenus*, ſaith *Veſalius*, riſing fleſhy from the forepart of the tranſverſe Proceſs of the ſecond, third and fourth *Vertebræ* of the Neck deſcending obliquely forward, is inſerted in the Tendon of the firſt Rib. Hence the ſecond *Scalenus* ariſing carneous from the lateral part of the tranſverſe Proceſs of the ſecond, third, and fourth *Vertebræ* of the Neck deſcending, it grows tendinous, and running over the firſt, it is inſerted to the ſecond or third Rib. Afterwards the third *Scalenus*, which ariſing carneous from the lateral forepart of the tranſverſe Proceſs of the ſecond, third, fourth, fifth and ſixth *Vertebræ* of the Neck, is frequently inſerted to the firſt Rib; for by theſe the three upper Ribs may be rais'd, ſuſtain'd and confirm'd, leſt the Force of the Intercoſtals, and other Muſcles, ſhould be directed downwards in a ſtrong Inſpiration; neither is the bending or turning round of the Neck hindred by the Force thereof; becauſe if they act together, and if the Neck with its erecting Muſcles, according to *Cowper* upon *Bidloe*, the ſpinal, the tranſverſal, interſpinal, the *longiſſimus dorſi*, *ſemi-ſpinatus*, by ſticking cloſe be ſtrength'ned, the Action of the *Scalenus* neceſſarily raiſes the Ribs; but in the moſt violent Reſpiration, there are many more concur than we are ſure of: In the fourth place the *Serratus anticus minor* of *Veſalius*, ariſing carneous, from the *Coracoide* Proceſs of the *Scapula*, deſcending obliquely forward, being made larger, ſlenderer and fleſhy, is inſerted into the anterior oſſeous Part of the ſecond, third, fourth and fifth Rib. 5ly, The *Serratus anticus major*, ariſing large, thick and fleſhy, from the *Baſis* of the *Scapula*, deſcending obliquely forward, is inſerted in the eight upper Ribs, as it were in the carneous Parts; two or three whereof, are inſerted below among them, with the like Proceſſes of the external oblique abdominal Muſcle. For if the Muſcles of the *Scapula*, the *Trapezius*, *Rhomboides*, and the *Levator*, make the *Scapula* to and again immoveable, then the Action of both or either of the *Serratus* raiſes the Ribs ſtrongly from the ſecond to the eighth; which we may plainly ſee in the moſt forcible Inſpiration. 6ly, From the back part of the upper *Serratus poſticus*, ariſing tendinous from the Spines of both the inferior *Vertibræ* of the *Cervix*, and the three ſuperior ones of the *Thorax*, is inſerted with carneous Teeth to the Curvature of the ſecond, third and fourth Ribs, raiſing theſe obliquely upward. 7ly, The inferior *Serratus poſticus* aſſiſts, which ariſing from the Spines of the *Vertebræ* of the *Loins*, and ſometimes from thoſe of the *Thorax*, is inſerted with clinging Fibres to the middle Arch almoſt of the ninth, tenth, eleventh, and the Extremity of the twelfth Rib; for here, from a kind of horizontal Courſe of Fibres, conducting or grinding theſe laſt Ribs outwards and backwards, it enlarges the Breaſt, and hinders, leſt from the contracted Fibres of the *Diaphragm* being drawn together, theſe Ribs ſhou'd conſtringe the *Thorax.*

But the Action of the oblique exterior Muſcle, that of the inferior and *rectus* conſpiring together, depreſſing the Ribs, binding the *Thorax*, giving Reſiſtance to the inferior *Serratus anticus*, if it concurs or agrees with the Action of the *Sacrolumbalis* of *Veſalius*, as yet a compounded Muſcle that is ſcarce diſtinctly deſcrib'd; it conſiſts of a *Series* of Muſcular Carneous Fibres, ariſing from the tranſverſe Proceſſes of the *Vertebræ* of the *Loins*, and the Spines thereof, and of thoſe aſcending into the Ribs and joyn'd there ſays *Steno*, by carneous acceſſory Muſcles proceeding from the Ribs: This Action I ſay, powerfully aſſiſts a violent Reſpiration, together with the Conſtriction of the *Abdomen*, by the Help of the tranſverſe Muſcle.

The *Sternum* being compreſs'd in Women, and the right Clavicles, the *Thorax* grows narrower, the cartilaginous Segments of that *Clavicle* grow ſooner into Bone on the upper Part, than the lower; hence the *Sternum* in thoſe Inſpirations is turn'd upwards and obliquely outward, and the whole *Thorax* does as it were riſe, hence alſo they reſpire freer, when their Bellies ſwell, or they are with Child.

It is neceſſary that the Muſcles ſerving for Reſſpiration, and ſuch as are obedient to the Will, ſhou'd be much larger and ſtronger than thoſe which perform Vital Reſpiration: Whence it is, that the Strength of the former, ſerves to encreaſe or diminiſh, or intirely to put a ſtop to either Reſpiration of the efficient Actions.

Hence is to be underſtood, that there are not two natural moments that happen in the Life of Man, in which the Pulmonary Veſſels poſſeſs the ſame Figure, Size or Action.

So that there is an *Antagoniſm* in this Place to ſome Muſcles, without an Antagoniſt Muſcle: Therefore the *Antagoniſm* is betwixt the Action of the Fluid moving the Muſcles, and betwixt the Reſiſtance of the ſimple Spring in the Solid.

From hence, there is no need for alternate Motions, acting reciprocally in both Parts, to ſuppoſe alternate Actions of the Humours, for 'tis ſufficient if it happen in either.

Human Will can ſtop the Force and Cauſe of Reſpiration, but it cannot directly ſtop the ſtrength of the Heart, therefore the Conſent of the Hearts Motion is ſtronger, more conſtant, and its Action frequenter; yet there is ſome Cauſe betwixt the Pulſe of the Heart, and Times of breathing, but by what Law we know not?

Hence we ſee a Neceſſity of the Hearts Pulſation from the Repetition of Reſpiration; but how long Life can continue without that, is the Queſtion?

Why in an *Aſhthmatick* Inſult, a *Peripneumonia*, difficult Breathing, in the Agony of Death, Reſpiration is made in the vital and voluntary Muſcles, ſtrongly concurring to the ſame Action, ſo that we ſee the Neck, *Scapula*, Breaſt, the lower Ribs and Back plainly move?

Why in perfect Health, when the Body is waking and at Reſt, is Reſpiration ſo ſlow, quiet and ſilent, that it is ſcarce obſerved, while at the ſame time there is a quick Circulation of the Humours?

Why in a Cough, ſhort Breathing and an accelerated Reſpiration, is the Motion of the Blood increas'd thro' all the Veſſels?

How comes the firſt Action of Reſpiration to be *Inſpiration*, but the laſt *Exſpiration*?

Why in dying Perſons, while Reſpiration ceaſes, do the Venous *Sinuſſes*, the *Auricles* and the Heart palpitate?

And how it is that in performing Reſpiration and continuing of Life, the Air is plainly uſeleſs in the exceſſive degree, whether heavy, light, moiſt, dry, hot, or cold; as alſo that which is too much compreſs'd or rarefied, as well as that which is not ſoon enough renew'd in a ſmall Space.

Of the Voice, Speech, Singing, Laughing, Coughing, &c.

THat this may be clearly conceiv'd, how a Man utters his Voice; this Sound is form'd from Exſpiration; therefore it is from the Expulſion or driving out of the Air, contain'd in the whole Capacity of the *Lungs*, into the *Aſpera Arteria*, by conſtringing the *Thorax*, from the *Aſpera Arteria* into the *Glottis*, ſaith *Caſſerius*, where from the Narrowneſs of the Paſſage the Motion is ſwifter, being broke or divided by the elaſtick tremulous Body, hence ſmitten into reciprocal Streams, it makes a Sound, as the *Naturaliſts* teach.

But that going out from the ſtraiter Paſſage of the *Glottis*, into the Cavities of the membranous Body of the Mouth and Noſtrils paſſing by theſe Places, as theſe Furrows, Trenches or hollow Places are ſmoother, rougher, opener or ſtraiter, or otherwiſe figurated various ways, ſo different kinds of Sounds iſſue from the Mouth; as the Workmen who deal in Inſtruments of Sound, eſpecially thoſe who make Organ Pipes demonſtrate.

But ſince the cartilaginous Sides forming the chink or cleft by its binding, can open or ſhut this chink by innumerable ways, as the Muſcles placed here, act variouſly; hence ariſes the Difference of the Voice, as to what is call'd by the Muſician acute or grave; for all that Buſineſs depends on a ſwift or ſlow Repercuſſion of rhe Undulation; but this is done quicker, by narrowing the way, or increaſing the Celerity of expelling the Air, on the other hand, the Gravity of the Voice is a ſlower Effect of the undulating Air, being deduced from a greater Aperture of the Chink, or a ſlower breathing out of the Air.

Hence it appears, from the Chink being too much dilated, that the Sound is deſtroy'd or loſt in them, who endeavour to produce a graver Sound than indeed they can effect; alſo the ſame thing happens in the Formation of the acuteſt Sound, that it almoſt brings a Suffocation, and cauſes a ſqueaking Voice to proceed from the *Larynx.*

If that Sound in the Organs ſituated without the *Larynx*, to wit, the Throat, the Tongue, the Teeth, the Lips, Cheeks, Noſtrils, membranous or muſcular Palate, in the various Meeting and Poſition of each being very much varied, is broken or divided, thence in its Paſſage thro', or Reflexion, be alter'd and determined or directed, it makes that which is expreſs'd by Letters, concerning the Riſe and Combination of which, and from thence, the Formation of *Speech*, let us look into the Works of *John Conrade Amman*, printed at *Amſterdam* 1692, who hath been a Man of vaſt Induſtry this way, and very eminent for his Succeſs in the Cure of dumb Perſons; neither ought we in this Place, to forget the Labours of Mr. *Ford* late of *Kenſington*, who hath brought this Art to ſo great a Perfection and Certainty, that he makes the *Deaf* as well as the *Dumb* to ſpeak intelligibly.

But ſince to ſing is to pronounce the Sounds according to Gravity or Acuteneſs, ſwifter or ſlower, ſtronger or ſofter, equally or by being fetch'd about, the Action of it is underſtood from which is ſaid before.

A ſmooth, lubricated Superficies in the Organs, ſeems to give a Sweetneſs to the Voice, ſo likewiſe the Conformation of the Throat, the Mouth, the Palate, and Noſe.

The Agility of the Muſcles ſerving to move the *Glottis*, the Laxity that follows the Cartilages of the Ligaments, knit to the *Larynx*, the Size of Difference, that the Structure of the *Glottis* admits in its Aperture, ſeem to produce a ready Faculty for the diſtinct and clear Formation of various Sounds.

The Conſtruction of the *Lungs* and *Thorax*, producing ſuch Extenſion, ſeems to be the particular Reaſon of their Strength and Uſefulneſs to the Body; ſo the ſingular Turnings in ſweet Singers depends on all theſe together.

Laughter is made, from the Dilatation of the *Lungs*, the Air being then received with quick yet ſmall and reciprocal Concuſſions, made by the inſpiring and exſpiring Organs, as if moved by little Waves moving in the *Lungs*, and in the *Aſpera Arteria*; in the mean time, the *Lungs* continuing in the ſame Extenſion, they rather ſhake than tranſmit the Blood thro' them; whence we may know, the Reaſon why Laughing wearies ſo much, and often turns to a Convulſion; firſt of all, only ſwelling or diſtending the jugular Veins, and thoſe of the whole Head; afterwards giving Redneſs to the Face, the Neck and Eyes: Sometimes if too extravagant, it brings on an Inability to take Breath, ſometimes Apoplexy and Death it ſelf: But on the contrary it is very healthful, if moderately uſed.

Alſo Coughing is evident from thence, for it is made from too great a Plenty of Air drawn into the *Lungs*, held there but a little, ſoon after by the *Larynx* being ſhut or clos'd together with the *Diaphragm*, thruſt into the Breaſt by force of the *Abdominal* Muſcles, the Air is condenſed; that ſtrongly preſſes againſt the ſides of the *Lungs*, from thence the *Larynx* being open again, it is violently ſhock'd, by the reciprocal exſpiring Concuſſions; hence it purges the Superficies of the *Bronchia*, whence is underſtood why *Laughing* ſo often ends in *Coughing*? How ſmall the Difference is betwixt theſe two Actions? Why ſtrong Singing, Scolding, the Aſperity or Roughneſs of the *Bronchia* produce it?

So alſo *ſneezing* already ſpoken of, is clearly underſtood from what hath been ſaid: *Gaping* or *Yawning* comes from expanding or ſtretching almoſt all the voluntary Muſcles together, eſpecially the *Lungs*, which breaths in ſome ſmall matter of Air, tho' ſlowly and by degrees, and that being retain'd there ſome ſhort time is rarefied, and exſpired again, as it was received, reſtoring the Muſcles to their former State and Condition. Hence the Effects thereof is to move, accelerate, and equally diſtribute all the Humours of the Body thro' all its Veſſels; and therefore adapt the Organs of the Senſes, and the Muſcles of the Body, to their proper Functions.

But how theſe Things are done, the erect Figure of the Body, its Bending and Extenſion in the Neck, Back and Loins; the various Motions of the Shoulder, Arm, Wriſt, Hand, Fingers, Thigh, Leg, Ankle, Foot and Toes, on which depend, Standing, Walking, Leaping, Running, Tumbling, *&c.* explain by their proper Organs of Motion, concerning which, we may look into *Fabricius ab Aquapendent*, and *Borellus* of the Motion of Animals; for this cannot be ſet forth in this *Compendium*, much leſs ſufficiently demonſtrated as is requiſite.

Therefore ſince we have thus far explain'd the Vital, Natural, and Animal Actions which are common both to Men and Women, it remains that we conſider, thoſe which regard or are proper to either Sex, for the Generation of their Off-ſpring, as they are abſolutely different from each other, as well as they differ by reaſon of Age, Temperament or the like

The

The Origine of the Maſculine Semen.

THE Seminal Arteries ariſing from the Fore-part of the *Aorta* under the Renal Arteries, ſaith *Veſalius*, altho' ſometimes it is call'd from the left emulgent Artery, deſcending obliquely with the ſpermatick Veins of its own ſide, the right whereof ariſes from the *Cava* under the Renal, the left from the Renal Vein, they are joyn'd together at an acute Angle included with theſe, with a common membranous little Sheath, being as it were cloſely conjoyn'd, ſo alſo they run ſecurely together, cover'd under the interior *Lamella* of the *Peritonæum*, upon the *Pſoas* Muſcles, and the *Ureters*, till they come at the Place of their *Exit*, in the Groin, where *Spigelius*'s carneous Fibres of the tranſverſe Muſcle and the oblique inferior one, receding a little mutually from one another, tranſmit theſe Veſſels included in its Sheath, ſo that the tranſmitting Place being higheſt in the tranſverſe Muſcle, the other is lower in the oblique aſcending one, and then alſo paſſes thro' the oval Ring, in the tendinous Part of the oblique aſcending Muſcle, with three lines inferior to the former; laſtly, this *Vagina* deſcends with its Veſſels upon the *Os Pubis*, and being brought into the *Scrotum*, makes the *Teſtes* it ſelf; but in all this courſe, from hence it binds out ſmall lateral Arteries: And then the three Places tranſmitting in the Muſcles, beſtow upon that a little, thin, membranous *Vagina*, but where it approaches nearer to the *Teſtes*, they conſtitute the *Pyramidal Body*.

In this very courſe ſaith *De Graef*, the ſpermatick Artery being bent a little into Spires, ſends forth Arterial Branches, which in a right, open and ſufficiently large Road, derive laterally the Arterial Blood into an aſſociate Vein, by a true *Anaſtomoſis* or Inoſculation; firſt of all, in the Pyramidal Body,

where

where the ſeminal Artery near to the *Teſtes*, beſtows a Branch on the inferior, and inward Part of the *Epididymis*, affording little Branches to that, from whence 'tis inſerted to the nervous Coat, and another Branch on the very top of the *Teſtes*; but there are many Branches from the large Trunk intimately mixed and communicating with the little Veins in the pyramidal Body, from whence they are ſpread all over the Circumference of the *Teſtes*.

For the pyramidal Body, call'd varicoſe, or *pampiniforme*, conſiſts of innumerable communicating Veins, which being united, make up as it were a Netlike Texture, ending in one ſeminal Vein, from whence there is conveniency of pouring in this Blood into the little Veins.

Thoſe Arteries which have penetrated the nervous Coat, being ordinarily divided into Branches according to *de Graef*, diſtinctly placed; then into innumerable ſmall ones, as *Ruyſch* ſhows, hence going into the fineſt Capillaries which appear infinite to the Senſes, they poſſeſs almoſt the whole Body of the *Teſtes*, and perhaps uſually poſited into larger Veſſels, ſays *de Graef*, ending in one great Trunk, the middle of the *Teſtes* continued to the *Epididymis*, they ſpue out their Humour or Fluid from a vaſt Number of little Mouths; hence they have no Veins, but end in Emunctories.

But thoſe Veſſels, ſaith *Leal Lealis*, are determinated in the *Epididyma* and the *Paraſtata*, caſting out their Humour into its hollow Canal; but its Fabrick or Structure is one continued, hollow, cylindrick Veſſel, complicated into innumerable Windings united together, and incumbent on the Body of the *Teſtes*, being watered by the Arteries, is brought into one Veſſel ending in the *ejaculatory* one; which riſing again above the *Os Pubis*, deſcending into the *Pelvis*, approaching near to the back part of the Neck of the Bladder, is determinated in ſeminal Veſſels.

To the ſame Structure thus form'd, are join'd the ſlender Nerves, from the nervous abdominal Network, together with the ſpermatick Veſſels, beſtow'd on the nervous Coat, being loſt in that and another that ariſes from the Twenty firſt ſpinal Pair.

The little ſmall Veins and innumerable lymphatick Veſſels, return that Humour again from the Body of the *Teſtes*, which remains from the Secretion made, which is probable in theſe in which it is elaborated, neither is there an Evacuation of the greateſt and ſubtileſt part of the *Semen* to be re-abſorb'd in theſe Veſſels, to be mix'd in the pyramidal Body with the venous Blood, and by this means change the whole Oeconomy of the Body.

The ſeminal Veſſels of *de Graef*, knit to the Neck of the Bladder on the back part by Membranes, are little blind Inteſtines, ſaith *Leal Lealis*, complicated into Windings, Turnings and Receſſes, in which the ejaculatory *Vas* ends, by degrees growing broader and more ſinuous, then again ſtraiter where it enters in, curved by a ready Road into theſe little Inteſtines, towards the larger bottom of thoſe; and hence again, according to the ſame Author, from another emunctory Canal join'd to the former at acute Angles, which is endowed with a Veſicle, which two Emiſſaries, join'd in the *Urethra* by an obtuſe Angle, end in one Emunctory Canal, lying open in the *Urethra*; in the mean time, both theſe Veſicles are tyed together with a muſculous Membrane.

All theſe things demonſtrate the Blood to be like that of the Kidneys, ſmall in Quantity, received from the ſpermatick Artery, moved ſlowly, and detain'd about the pyramidal Body, deſtitute of the thick red Blood by the Canals opening into the Veins;

Veins ; hence it is leſs red there, being much ſlower moved, and almoſt ſtagnating, in the narrow Paſſages and Windings of the *Teſtes*, which are, as it were of a cineritious or aſh Colour, the Blood being nouriſh'd and kept warm, adhering and growing thicker in *Highmore*'s Ducts ; is more ſlowly puls'd into the *Epididymis*, is again blemiſh'd and elaborated from the Foldings thereof ; and at length found in the ejaculatory Veſſel, opening wider by degrees, from whence in its dilated ſinuous Receſſes it is collected, kept at reſt, nouriſh'd and elaborated ; and alſo from the broader, convoluted, ſeminal Cells of the Veſicles it is propell'd, received, and ſtor'd up, being intirely quiet and growing thicker, it attains a greater Whiteneſs, and ſo being elaborated to its utmoſt Perfection is call'd *Semen.*

Hence no Humour is produced with ſo much Slowneſs, or retain'd by ſo many Ways or Paſſages, or being at reſt is cheriſhed and encourag'd ; but whether in all that obſtructed Courſe, any thing accrues to it, by the minute nervous Veſſels or otherways, is a Queſtion ? But there is brought to it thro' the Variety of Lymphaticks, ſomething of a ſubtil Fluid, thrown into the little Veſſels of the pyramidal Body, or the ſmall Veins of the ſeminal Veſicles, from whence again it is carry'd into the Humours of the whole Body ; both of which is highly probable.

The Humour which is found in the very middle of the *Teſtes* in the *Epididymis*, in the ejaculatory Veſſel and ſeminal Veſicles, being freſh, warm and a little diluted, then look'd upon with the beſt Microſcopes, conſiſts of innumerable, fine oblong, little, live Eels, ſwimming in the other part of this Humour ; but this is in every Man, Quadruped, Bird, Fiſh, amphibious Creature and Inſect, and that always, and only in this place, according to *Leenwenhoeck* : If theſe things are compar'd with the

Size, Figure, Place and Change of the Chicken in the Shell, deſcrib'd by *Malpighius*; and with the obſerv'd Law of Nature, in the Generation of Frogs; it will appear probable, that theſe *Animalcula* of the *Maſculine Semen*, contain the firſt Rudiments of the future human Body; eſpecially ſince where the *Teſtes* or this Humour is wanting, there is always Barrenneſs on the Part of the Male.

In the ſame place, ſaith *de Graef*, where the Exit of the ſeminal Veſicles opens into the *Urethra*, the *Glandula proſtata* of the *Urethra* ariſes about it, being one continued, conick Body, bound about with muſcular Fibres, compoſed of Twelve diſtinct Collections of Glands, ſo that the Glands of every Aggregate, terminating by their Emunctories in one Bag, to which they pour in their Humour, hence the Twelve diſtinct Bags open with as many diſtinct notable Emunctories into the Cavity of the *Urethra*, ſo that they bind on every ſide that *Exit* of the Veſicles; from whence they nicely mix the *Semen* and the Humour of the *Proſtata*, while the Veſicles and the *Proſtata* are encompaſs'd by the ſame muſcular Membrane.

The Humour made here, is ſoft, fat or oily, white and copious; after continued Abſtinence from the Act of *Venery*, it is frequently expreſs'd in the Action of Siege or Urine. This Humour contains not the deſcrib'd *Animalcula* in it, upon taking away the *Teſtes* and ſeminal Veſicles, neither is it then prolifick: Hence the thicker and more cineritious *Semen* ſeems to dilute, and perhaps in the firſt moments from the *Coition* to nouriſh the ſaid *Animalcula*.

The *Urethra* conſiſts of Two Membranes, and a cavernous Body plac'd betwixt theſe, the cavernous Body thereof being thickeſt betwixt the end of the *Proſtata* and the Union of the cavernous Bodies; from thence growing ſlenderer in its whole Courſe, it is groſſer at the forepart of the *Penis*, turning out, it leaves the Mouth of the *Urethra* open in the middle of the *Glans*, but by that means conſtitutes the external ſpongy Superficies of the *Glans*; terminated in the outward Skirt or Edge thereof, about the Connexion of the *Prepuce* or Fore-skin, it receives into the Cavity of its Pipe oblique Emunctories, according to *Drake*, from the Glands aſſign'd by *Cowper*, making a ſoft Humour eſpecially upon a flaccid *Penis*, that is beſtowed for neceſſary Uſes on the internal Superficies of the *Urethra*: In the external ſuperficies of the *Glans*, *Ruyſch* ſaith, it is covered with a little, ſubtil Membrane, under which lies hid the ſenſible nervous *Papilla*, which are the particular and immediate Cauſes of Pain and Pleaſure.

The cavernous Bodies, ariſing from the inferior Part of the *Oſſa Pubis* ſeparately, are cloth'd with its Membrane, and join'd mutually to each other by the Help of the *Septum Medium*, being loſt by degrees at the anterior Parts, they make that particular Body of the *Penis*, which being made leſs ſenſibly at the Foreparts under the Crown of the *Glans*, conſtitutes the interior Subſtance thereof; hence all this Body thus compos'd or form'd, is ſurrounded with a cellulous Membrane of a wonderful Texture; from hence with a firm or ſtrong nervous Caſe or Covering confining its Extenſion; and laſtly with the *Cutis* and *Cuticula*.

The Arteries, ſaith *Graef*, from the internal Iliacks, frequently carry the Blood into the very hollow cavernous Bodies of the *Urethra* and the *Penis*, where being divided into innumerable capillary Arteries, they are continued into Veins, but in theſe there are innumerable hollow Cells, according to *Ruyſch*, that communicate amongſt each other, and all evacuate themſelves into *de Graef*'s great Vein, running ſingly thro' the back part of the *Penis*, under the Ligament joining the *Oſſa Pubis*, about the *Proſtata*, laſtly dividing into Two Branches, they evacuate themſelves both ways into the internal Iliack Veins; but the Veins of the cavernous Body of the *Urethra* are placed for a neceſſary End or Deſign to thoſe Muſcles call'd the *Acceleratores.*

If therefore from what Cauſe ſoever, the Animal Spirits flow more from the Brain into the Nerves of thoſe Muſcles that erect the *Penis*, than thoſe Muſcles, ſays *de Graef*, ariſing from the external Bunch or Knob of the *Os Iſchium*, under the Origin of the cavernous Bodies, are inſerted in the firm, nervous Covering of thoſe Bodies, and there growing tendinous are loſt, the Body of the *Penis* is preſs'd cloſer to the *Os Pubis*, and the middle Ligament thereof: The great Vein of the *Penis* is more compreſs'd, the Veins of the *Prepuce* leſs; therefore the Arteries and the Veins are both fill'd, hence the Vein is more compreſs'd, from whence the *cellulous Sinus's* are fill'd with Blood; being therefore thus inflated, the *Penis*, the cavernous Body and the *Glans* all ſwell; ſo that by this means the tumefying Cauſes increaſe, from whence the *Penis* grows ſtiff, reddens, and is erected; in the *interim*, the muſcular Membrane of the *Proſtata* and the ſeminal Veſicles, from the ſame Cauſe ought to ſwell, and all the Nerves be ſtretch'd, hence the *Semen* from the Veſicles, the Humour from the *Proſtata* being expreſs'd, are gather'd together in that part of the *Urethra* which is free from the erecting Muſcles; while the tranſverſe which are imprinted from the external bunching of the *Iſchium* into the upper Part of the Bulb of the *Urethra*, and the *Dilatator poſticus* from the forepart and the lower of the *Inteſtinum rectum*, being fix'd into the lower and hind parts of the *Urethra*, dilate it here at the ſame time; laſtly being violently compuls'd by the *Accelerators* of *de Graef*, which ariſing carneous from the upper Part of the *Urethra* under the *Os Pubis*, ſurrounding the *Bulb* of the *Urethra*, join'd below, they run together, and are both inſerted to the ſtrong Membrane of the cavernous Bodies of the *Penis*, and likewiſe being convuls'd with the Muſcles of the *Proſtata* and the *Veſicles*, the Blood is chiefly driven into the *Penis*, and the *Semen* ejected with Force, the Spirits ceaſe their Motion, the Vein is freed, the Blood flows from the *Sinus's* into the Veins that are now relaxed, the extended Parts contract themſelves again, and the *Penis* flags or falls.

Hence therefore it may be known, what the Man contributes to Generation, the wonderful Riſe of the Beard and Puberty, alſo the Alteration of the Voice, Temperament of the Body, the Affections of the Mind, that either accompany or follow the Production of the *Semen*. Hence we may know, that the *Semen* is different or oppoſite to the Nature of the Animal Spirits, that of an oily, volatile, ſalt, or an hot fermenting Humour, but is a ſoft, viſcous, ſluggiſh, or unactive Fluid ; and it ſhows that the tranſverſal Muſcles of the *Penis*, are of eminent Service for dilating the inferior Part of the *Urethra*.

Of the Menſtrua.

WOmen have the *Os ſacrum* broader, and turning more outwards than that of Men, as alſo the *Os Coccyx* yields or gives more way backwards ; likewiſe the *oſſa innominata* are broader, and ſtand more at a diſtance from each other, and underneath they are turn'd a great deal more outward ; together with the inferior Riſings or Eminences of the *Os Pubis*, which have the ſame bearing : Hence, ſaith *Spigelius*, a Woman hath the greateſt Breadth about theſe Bones, the contrary of which is in Man, as alſo a greater Capacity of the *Pelvis* than what is to be met with in Men, yet in a Woman that is not with Child, there are not many things which fill her. Women have the forepart or appearance of the Breaſt much flatter or plainer than Men; but the Blood Veſſels, the Lymphaticks, the adipous and nervous Ducts, the Membranes and Fibres are much laxer in Women: Whence all their Cavities, Cells, Veſſels, *&c.* are eaſilier fill'd in them, and the Humours collected together; and hence the cellulous and adipous Membrane is always the thickeſt; but it is found again to perſpire much leſs than that in Men us'd to do, and therefore they much ſooner arrive at the *acmen* or height of their Growth.

In this *Pelvis*, the Situation is ſoft and pulpy, conſiſting wholly of Veſſels, eaſily extenſile, neither is the Womb very elaſtick, but almoſt free, neither is it fixed or ſcarcely compreſs'd, while it is defended from the expanded Membrane of the *Peritonæum.*

But that conſiſts of Membranes and Fibres of a turbinated or top-like Figure; according to *Ruyſch* and *de Graef*, it receives Arteries from the Spermaticks and Hypogaſtricks, united amongſt themſelves by *Anaſtomoſes*, ſurrounding the whole Womb, and as it were, conſtituting the greateſt Part of the uterine Body, from the like *Apparatus* and Origin, all the Veins equally communicate amongſt themſelves, ſo that the Humour can paſs and re-paſs from one thro' all the reſt; it is penced thro' in its internal Cavity, not only with the Emiſſaries of the *Fallopian* Tubes, but with many ſmall Paſſages, exſuding a ſoft, wat'ry, mucous Humour, with which the Cavity of it is internally lubricated, defended and hindred from Concretion.

As ſoon as a healthful Virgin hath arrived to the Term of her Growth, ſhe begins to make more quantity of good Humours than is required to ſupport the Body, ſince there is nothing further neceſſary to its Increaſe, ſhe will fill more the Veſſels, eſpecially thoſe of the Womb and Breaſts, tho' they are very gently compreſs'd; this will dilate more than the reſt, hence it extends the lateral Veſſels that are very full, evacuating an Humour into the Cavity of the Womb; from whence, Pain, Heat and a Weight are perceived in the Loins; at the *Pubes* and the Groin; a ſmall Fever is raiſed; the Veſſels of the Womb are dilated, ſo that they expreſs the Blood it ſelf into the Cavity of the *Uterus*; the Mouth whereof is lubricated, relaxed, and the Blood iſſues out; ſo that its quantity is leſſen'd, thoſe Veſſels are not preſs'd ſo much, but contract themſelves, the Blood is retain'd; the groſſer Part of the *Serum* is let out; at laſt, that accuſtom'd *Lympha* only, makes more of the Humours again, which is eaſily depoſited into the Veſſels that have been once dilated; hence the *Menſtrua* are evacuated, and return at different times according to different Conſtitutions.

But ſince the Mammary and Epigaſtrick Arteries, have a wonderful Intercourſe with each other, by the Communication of their *Anaſtomoſes*, according to *Nuck*, it is evident, the ſame thing is in the Veins; for upon uterine Evacuations the mammary Veins are leſs diſtended, and when the *Menſtrua* are approaching, the Breaſts ſwell, and ſo on the contrary.

Hence is underſtood, why Women who are of a harder Compages or Texture of Fibres, or dryer, likewiſe ſuch as are very muſculous and leſs fat, and alſo daily uſed to hard Labour, do leſs, and that ſlower and by longer Intervals, and ſometimes excern no menſtrual Blood at all? While at the ſame time, the ſofter, laxer, and ſuch as are more juicy, and in ſome meaſure fat or plump, that are not ſo muſculous, and live a lazy or idle Life, void greater quantities of Blood, that ſwifter and in a leſs period of time? And alſo, why this Humour retained here, makes to it ſelf ſuch various ways, with other Veſſels that are dilated, and expels them periodically? and why laſtly the *Menſtrua* ſhou'd begin, increaſe, and end in ſuch a certain time of Age, in which they ſooneſt aroſe? and why they ceaſe again immaturely in the ſame?

Of Conception.

Conception, ſaith *de Graef*, depends on two ſuperior *Foramina* of the Womb, iſſuing from two membranous Canals, dilated by degrees round the *Matrix*, from a narrow Capacity, winding or turning in little cellulous half Circles, at laſt from a broad Orifice furniſh'd with carneous Edges, plac'd about it; they conſiſt of an interior glandulous Membrane with fleſhy Ligaments; but theſe *Tubes* in almoſt all kinds of Animals at the Time of *Conception* ſwell and grow rigid or ſtiff, being ſupply'd with Caruncles: In the Diſſection of the Dead Bodies of Women, the *Tube* is often ſeen ſurrounded with a rim or border of little Eggs; alſo in the cellulous Receſſes of thoſe, *Fœtus's* have been found, in different Places and of different Sizes, according to the time of *Conception*.

The two *Ovaries* are laterally knit to the *Uterus*, ſaith the ſame Author, about two Thumbs breadth diſtance, and which by the Aſſiſtance of other Membranes ariſing from the *Peritonæum*, are ſtrongly inclos'd; theſe are rough, of an uneven Superficies, ſufficiently large, ſpherical Bodies, included in a ſtrong Membrane, they are water'd by the *ſpermatick* and *hypogaſtrick* Arteries, united ſo before their Entrance into this Place, as if one Veſſel being thus form'd, they ſeem to conſtitute a *reticular* or network *Plexus*, by reaſon of the incredible Number of Corpuſcles, the ſame is true of the Veins ſeated here, and alſo of the numerous lymphatick Veſſels;

all theſe Veſſels with the Nerves as they make the Structure of the *Ovary*, ſo they are intermixed that the Fabrick can ſcarcely be deſcrib'd; but in the Superficies of the *Ovaries* bound under the Membrane, are found little ſpherical Bodies underneath, concreted by a thickiſh Shell, from the very Subſtance of the Ovary, of a pellucid Colour, replete or fill'd with a Lymphatick Humour, that thickens at the Fire, conſiſting of two little concentrick Membranes, ſtrictly tyed by turns to each other. Beſides *Ovaries* are preſent in every ſound female Body, tho' in Youth before the Years of Puberty, they are ſmall, by degrees they grow larger, but are biggeſt at the Time of *Conception*, but they are obſerved to leſſen or diminiſh again in Old Age. But the little Bubbles already deſcrib'd, lodging in their Shells or Cups at the minuteſt Ends or Terminations of their Veſſels, juſt after *Venery* ſcarce appear at all, but by degrees tumefy, by little and little become pellucid, grow thicker in their Membranes, raiſing and extending or ſtretching the Membrane of the *Ovary*, ſo they dilate into the Form of a *Papilla* or Nipple, that they ſeem to hang like Fruit each upon its Stalk, from whence being ſeparated, they have a Cicatrice or hollow Scar, in the Subſtance and broken Membrane of the *Ovary*, healing or co-aleſcing again by degrees; at length in theſe little Bubbles, lodging in this part of the Ovary, the *Fœtus's* have been diſcover'd.

From all which it appears ſufficiently plain, that theſe little Balls or Bubbles are Eggs, which derive their Structure from the Veſſels of the Ovary, but its Liquor from the Humours wonderfully prepared there: And therefore this admirable Fabrick deſtined or appointed for this Office, is intirely from Nature.

From whence is known, that the *Tubes* being ſtimulated by *Venery*, grow ſtiff, from the rigid muſcular *Fimbria* or Edges like Fingers embracing the Ovaries; theſe being preſs'd cloſe, expand or open their Mouths from this Embrace, then the Egg being ripe and ſeparated, by degrees is ſqueez'd into its Cavity, and propell'd by the leiſure Motion of their muſcular Ligaments, at length is ſent down into the Cavity of the *Uterus* for the ſame reaſon, and is there cheriſh'd and encourag'd if it meets the *maſculine Semen*, or elſe expell'd if it was received into the Womb without it.

For if we may animadvert upon thoſe things which manifeſtly happen in all *oviparous Creatures*; as alſo upon thoſe which are demonſtrated by our very Eyes to be in viviparous, at different times from the *Coitus*; laſtly in thoſe which are obſerv'd to happen in human Women, as well in a natural as preternatural State, in thoſe with Child, and thoſe brought to Bed being freed from the Part expuls'd; then it will appear that this *Modus* is neither impoſſible nor foreign to Nature, but on the contrary, muſt be held univerſal; as falſe Conceptions, Abortion, and the *Fœtus* found in the Cavity of the *Abdomen* confirm.

Therefore the Maſculine *Semen* abounding with living *Animalcula*, ſtirr'd up and moved by the greateſt Force, the utmoſt Heat, and perhaps the vaſt Plenty or Abundance of Animal Spirits, ſent by a violent *Impetus* into the Woman's *Uterus*, then equally turgid, hot and moving, and at the ſame time equally water'd with a Flux of its own *Lympha* and *Spirits*; by and by being retain'd, heated and agitated from the convulſive Conſtriction of the Womb, running from the Egg, by a ſmall lively Part enters incredibly thro' the then dilated Pores of the glandulous Membrane of the Egg, it is there retain'd, ſupported, kept warm and nouriſh'd, it ſuffocates the *Animalcula* that are not ſo lively as it ſelf; and ſo Conception is made.

Which may be done therefore in every place, where ſuch *Semen* can moiſten or water the Egg; hence being pour'd thereon by *Fallopius*'s *Tube*, applied to the Ovary, or meeting therewith in ſome Receſs of that *Tube*, or otherwiſe in the very Cavity of the Womb, where-ever it can effect the ſame; yet it is not perhaps improbable, that the Conception is made perfectly from theſe brought to, and join'd with the *Uterus* at the ſame time.

The impregnated *Egg* is contain'd in the Womb, being ſhut up by the Stricture of its Muſcles; it ſwims in a vaſt Plenty of abounding Humours, which being ſtill made more liquid by Heat and Motion, they enter firſt of all from Impulſion by the ſpongy Paſſages adhering to one part of the Egg, diſtending, filling and increaſing its Bulk, where again being render'd ſubtiler from the ſame Cauſes, they nouriſh the *Embryo*, ſurround, embrace and defend it againſt an unequal Preſſure; and alſo they make the Membranes of the Egg in like manner thicker, and at the ſame time ſtretch or extend it, firſt in that part in which it ſtuck to the *Ovary*, ſo that they may there form the Rudiments or Beginning of the *Placenta*, which ſeems to be that very Receptacle of the Egg, firſt of all forming the Subſtance, which increaſes in Dimenſion almoſt every moment of time.

But while the very ſame Cauſes are ſtill conſtantly more and more renew'd, they proceed to increaſe the Size of the *Egg* and the *Embryo*, and likewiſe the *Meatus* as well of the *Placenta*, as of the little Membranes are inlarged; the *Egg* begins to fill the Capacity of the *Uterus* with its own Bulk, to apply and joyn its Convexity to the hollow Superficies thereof, and every where to be united to the ſmall ſlender Veſſels, ſent out and received in there, but particularly in the Place of the *Placenta*; by which means the Womb is extended every way round, and by an equal Proportion all its Veſſels are inlarg'd in equal meaſure, receive more Humours into them, and conſume the Materials of the *menſtrual Plethora* hence in like manner from the ſame Proportion, by which the Paſſages of the Egg increaſe, likewiſe the Emunctories of the *Uterus* are dilated, ſo that the Capacity of thoſe united to theſe, in courſe joyn the Veſſels of the *Ovum* and the *Uterus* together; for the ſame reaſon the Efflux of *Lympha* or Blood is hindred from out the Womb, and it occaſions the uterine Veſſels to be emptied into the diſtended Egg and its Ducts, and by an interchangeable Courſe thoſe of the Egg into the *Uterus*.

And becauſe the *Fœtus* is now join'd by the *Navel-ſtring* to the very *Placenta*, and determines the Humour here, from both the conveying Veſſels out of the *Fœtus* into the *Placenta*, but from greater Veſſels bearing out of the *Placenta* into the *Uterus*, it is evident that all the Humours collected here, muſt be perpetually thus renovated by theſe ways, ſo that it cannot ſtagnate or putrefy.

But where this mutual Enlargement of the Inoſculation ſwells or grows bigger, that the internal uterine Emiſſaries may ſend forth their Blood, and otherwiſe receive it again, then the abounding Blood contain'd in the large *Arterial Uterine Veſſels*, brought to the *Uterine Placenta*, may be driven from the dilated Veſſels thereof into its Structure, and ſo ſeems to be ſent to the *Fœtus*; becauſe an *Hemorrhage* happens in Abortion, Delivery, wounds in Gravitation, Child-bearing, *&c.* from the Separation of the *Placenta*; as alſo the ſpewing out of Blood in the *Fœtus* upon the Mother's being only wounded ſeems to prove that; altho' they may ſeem to hinder the Veſſels from appearing in the *Cadaver*, and the intire little Membrane, binding the Superficies contiguous to the Womb.

For the whole Body of the *Placenta*, ſaith *Ruyſch*, is made up of innumerable Arteries, diſpers'd round every where, as in the *Cortex* of the Brain, interwoven by the like Artifice with Veins, Lymphatick Bags and Veſſels; then it is ſurrounded with a little thin Membrane, very apt to tear; it receives, according to *Spigelius*, Two *Arteries* running retrograde, and proceeding to the Navel of the *Fœtus*, there ſent in to the ſubcartilaginous Subſtance of the *Navel-ſtring*, being there ſupported and defended, bringing back Blood from the *Fœtus* that is not ſo proper for Circulation; but the Origine of the Veins is ſo fine, that they ſcarce appear at all, yet being collected together into one Trunk, is inſerted into the *Navel-ſtring*; this Vein entring in by the *Navel*, tending upwards, enters thro' the Fiſſure of the middle of the forepart of the Liver, at the inferior part into the great *Sinus* of the *Vena Porta*, agreeable to *Gliſſon*, and pours in all the Blood it carries, yet ſo that from the Entrance of this umbilical Vein, it is placed in the *Sinus* of the *Vena Porta*, from thence, according to the ſame Author, another Pipe going out from that Region into the *Cava*, where it is tyed to the *Diaphragm*, from whence it may eaſily furniſh Blood to the *Liver* or the *Cava*, and from thence to the Heart; from thence being diſtributed according to the Laws of Circulation, thro' all the Circumference of the Body.

Furthermore, the Blood pour'd in from the whole Body of the *Fœtus* and the umbilical Vein, into the venous *Sinus* of *Lower*, entring almoſt at the Auricle, deſcends at one ſide into the Heart as in *Adults*, but at the other, it is thrown againſt the middle Partition betwixt the Two Auricles; in which Partition is placed an open *Foramen* or Hole, to which lies the membranous Part, ſo that its moveable Part has Communication with the Cavity of the left

Auricle, from whence it appears to act upon, or move the Portion of Blood from the right Auricle into the left, as long as the Lungs are not moved; or at leaſt, in the next adjacent Parts in the Auricles, from the venous *Sinus* of the *Cava*, into the venous *Sinus* of the *pulmonary Vein*.

That Portion which enters the right Auricle of the Heart, is all moved by its Force into the Trunk of the *pulmonary Artery*, which from the Obſtruction and difficult Paſſage thro' the Lungs, ſuffers a great Reſiſtance; hence it forcibly dilates the free Trunk of the Artery; then paſſes in a ſmall quantity thro' the Lungs, and going ſlowly thro' the Arterial Veſſels is hindred from Concretion, growing bigger, and ſtretching out according to the Increaſe of the *Fœtus*; from thence it returns from the Lungs into the Pulmonary Vein, is mix'd to the whole Maſs by the Admiſſion of the *Foramen ovale*, neither is it a little obſtructed in its Paſſage by this gentle Motion of the Blood; from whence both is driven into the left Auricle, from thence into the right; but the greateſt Part of the Blood of the right ſide of the Heart finds in the arterious ſide of the pulmonick Canal, an open channel, ſaith *Bartholin*, every where equally broad from the pulmonary Artery, entring a little obliquely into the *Aorta*; by which therefore, all that Blood paſſes from the pulmonary Artery into the *Aorta*, being puls'd from the right Ventricle, which can eaſier maſter the Reſiſtance of the Blood in the *Aorta*, than the obſtructed Lungs can procure it; but the left Ventricle of the Heart driving the Blood forward, mixes with that Blood that will be ſhortly deſcrib'd; therefore the Blood of the *Fœtus* wants all the Effects or Operation of the *Lungs* upon the Blood, yet it acts upon it however; and ſo the ſubtil Part or Portion of the Blood of the *Fœtus*, ſeparated in the Veſſels of the Mother's *Uterus*, and elaborated in the

Placenta, is conſtantly mix'd with the Blood of the *Fœtus*, afterwards flowing thro' the minuteſt Veſſels of the Body; but the thicker Part given to the umbilical Arteries, by a mechanical Neceſſity from the Oppoſition of its Courſe, is ſubdued again from the Reſpiration of the Mother; while in the mean time, the Obſtacles have regard to the Life of the *Fœtus* in the Paſſage thro' the *Placenta.*

Nevertheleſs, there is a nutritious Lymphatick prepared in other uterine Veſſels, which is made ſo fine and ſubtil, that it can be moved out of the *Meatus's* or narrow Ducts of the *Uterus* into the Pores of the *Chorion*, and being more nicely changed in the Veſſels thereof, paſſes into the little Canals of the *Amnios*, where being further wrought or elaborated, drops into the Cavity of the *Amnios*, and being there drawn in at the Mouth of the *Fœtus*, is ſwallowed, lodges in the Stomach, and is digeſted, being acted upon by the *Bile*, the *Pancreatick Juice*, *Saliva*, and *Inteſtinal Humour*; it paſſes into the *Chyle*, drawn in by the chylous Ducts, and into a ſoft or pulpy *Fæces*, being driven by the Motion of the Guts, even to the *Sphincter* of the *Inteſtinum rectum*, after Collection in the *Colon* and *Cæcum*, but not evacuated, becauſe the Strength of the *Sphincter* cannot maſter them, while there is no Action of Reſpiration; whence it is, that in a perfect *Fœtus* this whole Tract of the Inteſtines is often full.

But ſince the *Saliva* and *Mucus* in Deglutition, the *Bile* and other Humours by overflowing, are received in the Guts, and all ſuch like, continually depoſe ſome *Fæces*, theſe being added to the former matter, concur to the making thereof.

Nay the *Kidneys*, ſays *Euſtachius*, at this time large, and being aggregated from leſſer Bodies, water the urinary Bladder by a continual dropping, filling of it gently by degrees, with a ſmall Quantity at a time, of a ſoft, unacrid Urine; but the Emiſſion of this is ſtopt from paſſing thro' the *Urethra*, it being not able to overcome the Obſtacle of the *Sphincter*, except by the force of Inſpiration; but where it abounds, it enters into a membranous Canal accorcording to *Spigelius*, always going out from the bottom of the Bladder aſcending upwards, iſſuing from the *Navel*, ſtretch'd out with the *Navel String*, even to the Root of the *Placenta* where it ends, agreeable to *Hale* in the Philoſophical Tranſactions in a particular Bladder, proper and diſtinct from the *Amnios* and the *Chorion*, conſiſting of a Membrane finer than the other two, of an Oval Figure ſituated betwixt the *Placenta*, cover'd over with the *Amnios* and the *Chorion*, and betwixt the *Chorion* turn'd back upon that, and united thereto; for this Store houſe of Water, the Humour whereof grows more in Quantity, of a higher Colour, and approaches nearer to Urine, as the *Fœtus* encreaſes in Size, and is nearer to the Birth.

Therefore where the Inteſtinal *Fæces* and Urine encreaſe, and have not Power to be expell'd, the Quantity, Weight and Acrimony becomes troubleſome to the *Fœtus*, who now turns his Head downwards into the Place, where the internal Mouth of the *Uterus* is placed, his Face being in the mean time towards the *Os Coccyx* of the Mother; the *Inteſtines* and *urinary Bladder* being fill'd, begin to ſtimulate the Fibres, to excite in them the Senſe of Pain, and to produce Motion and Contraction in the abdominal Muſcles and to the whole *Fœtus*, from whence the firſt Diſturbance is increas'd, hence it begins aſſiduouſly to ſtruggle with all its Endeavours by turning it ſelf every way, to deſcend towards the lower Parts, and to create a *Teneſmus* to the Mother; hence the abdominal Muſcles begin to be violently drawn together, and the *Fœtus* to be driven downward into the *Pelvis*, and ſo the proper *Teneſmus* to be increas'd, from vhence by the utmoſt Endeavours of the Mother and the Child, the internal Orifice of the Womb is dilated, at that time anointed and made lax, from the moſt lubricating Mucilage, the Water of the *Allantoides* and the *Amnios* is driven forward, the little Membranes are broken, and the Waters flow out, the Head is mov'd or puſh'd on to the Capacity of the dilated Orifice, and then by the Addition of the Mothers throws, it is excluded thro' the lubricated Places, being follow'd by the *Navel String*, the Membranes and *Placenta*, call'd the *Secundine* or *After-birth*, and oftentimes Blood iſſues out with it.

Theſe being diſcharg'd, the Fibres of the Womb, the *Peritonæum*, the Muſcles of the *Abdomen* and the other Veſſels, which were ſo much diſtended during the laſt Period of Gravitation, begin to contract themſelves and their Veſſels, eſpecially the *Uterus* which as *Ruyſch* ſaith, gently and by degrees contracts it ſelf, expelling the Blood collected here, being firſt, pure, and in Quantity, then diluted and leſs, at length growing viſcid, pale, and very little, by the Name of *Lochia*; which are different as to Plenty, the time of Evacuation, Colour, Smell and Conſiſtency, as there is a different Temperament or Conſtitution of the Woman in Childbed, her giving of Milk, *&c.*

After theſe Parts are contracted, the Veſſels being more conſtring'd, give a greater Reſiſtance to the Blood ſent hither, ſo that the third Day after Delivery, the *Hypogaſtricks* that communicate with the Breaſts, begin to infuſe or pour in more Blood to theſe dilated Parts, that were us'd to be brought to the Womb, and therefore aqueous chylous matter therewith; from whence the Veſſels of the Breaſts are fill'd and more diſtended from the ſame matter; hence from the Alteration of the Motion of the Humours ariſes a little *Fever*, a ſwelling, Pain, Hardneſs and Milk in the Breaſts.

For the Breaſts, ſaith *Nuck*, being fabricated in a Place at Liberty only with Fat about it, and under a Skin that is eaſily ſtretch'd or very dilatable, they receive external Arteries from the *Axillaries*, internal ones from the *Subclavians*, ſent down into the *Thorax* or Cheſt, by the *Intercoſtals* and the *Sternum*, going out of thoſe Parts, joyning to the Breaſts, and communicating to the *Epigaſtricks*, from whence they paſs into wonderful ſpiral Contorſions and little Knots, and then emit ſmall milky Pipes which uniting together grow bigger, and laſt they form the great broad lactiferous Veſſels, ending in one ſtrait one, by a little narrow Channel iſſue out in the *Papilla* or Nipple, yet ſo, that from the Arteries by the milky Veſſels into the *Nipple*, from that by the Milky Veſſels into the Arteries, there is a free, Egreſs and Regreſs; but theſe nervous, ſpongy *Papillæ*, have many Emunctories, varying in Number, and communicating by *Anaſtomoſes* or Inoſculations before their *Exit*; from whence Suction being apply'd, the Milk comes forth, and is continually renew'd or made again, and that more in Plenty according as the Breaſts are ſuck'd the more.

That Milk eaſily paſſes into Whey, Cheeſe, Cream, and Butter, the caſeous Part of which wonderfully hardens; that it does not grow hard at the Fire like the *Serum* of the Blood, but exhales off from the remaining Dregs, and often ſours of its own accord; is ſweet, white, and almoſt without Taſte, is from the Chyle, and the oily, ſoft, maternal Humours mixed in the Circulation.

And hence it is plain, why Pain in the Breaſts, Hardneſs, Tenſion, Elevation of the Nipple, and a dripping of *Serum* at Evening happen, during the Time of Gravitation? And why theſe are increas'd at firſt, Three Days after Delivery?

Then whence it comes, that upon a Repulſe of the Mik, the *Lonchia* are greater, and ſo on the contrary?

Likewiſe why Colour, Smell, Taſte and the Strength of what is taken in at the Mouth, is ſo remarkable in the very Subſtance of the *Milk*?

Why does the *Milk* ſcarce flow at all naturally, but upon the firſt ſucking leaps out with force?

Why there is *Milk* in the Breaſts of Infants of both Sexes, in Boys as well as Girls?

And why of all the Animal Humours *Milk* only naturally ſours after that manner? And why it ſo eaſily depoſites a Cream and Cheeſe?

The *Fœtus* in the very Labour, endeavouring by continued Struggle, and being expos'd to the Air, dilates its Breaſt, admits in the Air, expands the *Lungs* to their utmoſt Dimenſion, inlarges the Veſſels thereof, leſſens the Reſiſtance of them againſt the Blood of the Pulmonary Artery, from whence it ruſhes violently into the Veſſels ſet at Liberty, flows into the Arterial Canal, and being plentiful and ſwift, it runs into the Pulmonary Vein, preſſes the Valve of the *Foramen Ovale*, ſhuts the *Foramen* it ſelf, enters with all its Quantity into the left Ventricle of the Heart, and is expell'd again, it preſſes the Side of the *Aorta* more, folds together, contracts and ſhuts the Arterial Canal; hence the Blood of the right *Auricle* and the venous *Sinus* is driven into the right Ventricle, from thence it is mov'd into the *Lungs*, and Reſpiration is made as in Adults or grown Perſons, the Membrane of the *Foramen Ovale* grows thick at the Edges thereof, the Arterial Canal is chang'd into a Ligament.

But from the binding of the *Navel String*, near the Skin, nothing flows by the Vein thereof, into the Liver; the Vein changes into a Ligament; then the ſwifter Motion of the Blood of the *Vena Cava* compreſſes the oblique venous Canal, that it may harden into a Ligament, and alſo the umbilical Arteries are conſolidated.

Reſpiration being now perfected, the *Fæces* being black, tough, ſhining like *Opium*, call'd *Meconium* is purg'd out, ſo likewiſe the urinary Bladder by the ſame Labour, and from tying the *Urachus* is evacuated by the *Urethra*, as in Adults.

From all which things, all theſe Problems are reſolv'd, as firſt, what does the Father or Mother contribute to the begetting of their Off-ſpring?

What is the Cauſe of Barrenneſs in either Sex, in the Male or Female?

Whether from the Maſculine *Semen* alone, a real Man can be produced, by any Art?

Whether any Woman, from any natural Cauſe, without the Converſation of Man, can be fruitful?

Whether the Menſtrual Blood be malignant and venomous, or endued with any Poiſon? Or whether it is to be eſteem'd impure and a Recrement?

Whether a Woman makes any true *genital Semen*, like that of the Nature of Man's, that can conduce to the Production of her own like?

Whether from the Mixture of the *Semen* of either, Ebullition, Fermentation, or any other Action makes the Body of Man?

Whether *bona fide*, a certain Place proper for Conception, can be aſſign'd?

Whether the Woman, beſides Warmth and Nouriſhment, gives any Form to the *Fœtus*? Whether the Force of Imagination of the breeding Woman teaches us that?

What is Fecundity?

From whence the Membranes of the *Fœtus* take their Origin, as to matter, and as to the Cauſe?

From whence the *Placenta*? the *Navel String*? And how are the *Embrio* and *Fœtus* tyed to that?

Whether is the *Fœtus* nouriſh'd by the Mouth, or the *Navel*, or by both? And with what Difference, according to the Difference of Time from the Birth?

Whether the *Fœtus* hath all its *Viſcera*, Veſſels, and Members together? Or that it changes its Form or Figure from the firſt *Animalcula*, then to an amphibious Creature, and laſtly, to an Animal having the Breath of Life in it: Or whether it breaths in the Womb, and makes uſe of Air?

Whether it exonerates in the *Uterus*? And why not? Whether the *Meconium*, found in the *Vagina* or Neck of the Womb, or fallen from thence be an Evidence of the Death of the *Fœtus*, or otherwiſe what is?

Whether there can be a *Superfœtation*, or one Conception form'd upon another? And why is it ſo rare, if ever?

Why have *Twins* if there be three or four of them but one *Placenta*, as it appears they are tyed to, and yet every one poſſeſs proper or diſtinct *Navel Strings*, and Membranes? Whether becauſe the little Eggs are each united only to one Cup or Stalk? Or whether that is always and in every Place found true?

From whence comes the nauſeating in a Woman with Child, Pukings, Vomitings, Faintings, Horrors, debauch'd Appetite, Hardneſs of the Breaſts, Pain, Swelling, Waſting, Retenſion of the *Menſtrua*, Short Breath, Cough, *Varices*, or an Enlargement of the Veins of the Feet, Legs, Thighs and Belly?

ΠΑΘΟΛΟΓΙ'Α or *Pathology.*

The Nature of a Diſeaſe.

HItherto hath been declared and explain'd, from the Indication of their Cauſes, the Actions and Principles that are exercis'd in the human Body, by the Motion of the Humours in their proper Veſſels, and the Reſiſtance the Veſſels give to thoſe Humours, being call'd by a known Term *Functions*; and theſe us'd to be diſtinguiſh'd into Vital, Natural and Animal; the Vital Functions are thoſe which make Life, ſo that it cannot want them; theſe are the muſculous Actions of the Heart; the ſecretory Action of the *Cerebellum*, the Action of the Lungs and Blood, and the Circulation of the Spirits thro' thoſe Organs, the Arteries, Veins and Nerves; from whence 'tis plain, that theſe in their Perfection may encreaſe or leſſen much, and yet Life remain ſtill: The Natural Functions are thoſe which change or alter the Things ſo, which are received into the Body, that they paſs into our own Nature, or become Part of our ſelves, which are the Actions of the *Viſcera*, Veſſels and Humours, receiving, retaining, moving, changing, mixing, ſecerning, applying, excerning or carrying out, and conſuming what is brought unto them, which alſo may be convey'd in divers Parts: The Animal Functions are thoſe which happen ſo in Man, that either human Intellect conceives *Ideas* of the ſame Nature from thence, which are united to the Corporeal Action, or the Will is moved from theſe excited Actions; ſuch are the Taſte, the Touch, the Smell, the Sight, and the Hearing, Perception, Imagination, Memory, Judgment, Reaſoning, the Affections of the Mind, voluntary Motions; in all which is alſo a great variety of Degrees. From hence may be phyſically underſtood, what Life properly is, how long it laſts, in what Things it accurately conſiſts, what it may want, and yet be able notwithſtanding to continue; hence alſo Health is underſtood to be a Faculty of the Body, apt or perfectly fit for the Exerciſe or Performance of all its Actions. Laſtly, It appoints all the Effects of thoſe Actions, to determinate Motions and the Unalterableneſs of the Things taking into the Body.

The State of the Living Body taking away, or diſabling the Faculty from the Performance of any Action, is call'd a Diſeaſe; the *Idea* of which is the Poſſibility of the Abſence of ſomething requiſite to the Exerciſe of the Action, or the Performance of ſomething preſent, that is repugnant to the ſame: Neither is the mention made of the Mind in this Definition; becauſe the State of the Mind individually attends or accompanies the determinate State of the Body; and becauſe Medicine acting upon the Body only, Habit or Cuſtom reſtores the Conditions of the Mind; as alſo becauſe the alter'd Condition of the Mind, neither produces good nor harm, to the State of Health, except it ariſes from ſome corporeal Effect.

He therefore that wou'd perfectly underſtand all the intellectual Conditions requiſite to Actions, he may plainly ſee the Defect of the Condition from the Knowledge of the Diſeaſe, and again we'll take the Nature of the Diſeaſe from thence, neceſſarily following from the Knowledge of the Defect: which is call'd *Pathology*, and is divided into its proper Parts.

The Differences of Diſeaſes.

THerefore as well as Actions, ſo Diſeaſes may be diſtinguiſh'd, as the Conditions to Actions, and alſo the Defects of them: Hence 1ſt, Diſeaſes of a ſimple, ſolid, or organick Part. Secondly, Diſeaſes of the Humours. regarding their Nature, Quantity and Accidents. Thirdly, Diſeaſes compos'd from both theſe, which are human, and that Male or Female which relates to Men and Women; to all which *Claſſes* we ſhall proceed in a *Compendium.*

Similar Diſeaſes.

A Diſeaſe of the moſt ſimple ſolid Part, call'd *Similar*, properly in the firſt Place, obtains in the laſt or extremeſt Fibre; which ſince it is a Body merely terreſtrial, fine, ſimple, nervous, or elſe ariſing from Nerves, made up of the moſt ſubtil earthy Parts, connected by a certain Strength, it is ſubject to Diſeaſes of too much force, too great Weakneſs, Contraction, Relaxation, or Solution of Unity: The firſt Four have always a certain Reaſon from the *Symetry* of their Body; hence there is a ſalubrious Difference to one, and oftentimes a morbid one to another.

The ſame Diſeaſe together with its Differences obtains. 2ly, In the minuteſt Membrane made from Fibres of the like Nature, being joyn'd or interwoven together: And 3ly, In the ſmalleſt nervous Canals, conſtituted from a hollow cylindrick Concretion of ſuch a Membrane. 4ly, In a Membrane made up of ſuch little Canals, executing the Office of the Fibres. 5ly, In Canals form'd from ſuch a compounded Membrane, which are all the larger

Veſſels of the Body, only differing in a different degree of Compoſition: 6ly, In thoſe ſolid Parts which conſiſt of Canals, deſtitute or void of any diſtending Humour, or which from a groſs one, together with a proper coercing and concreted Veſſel, changes as it were into a particular thick Part: For if the Diſeaſes attending all theſe ſeparately were examined, they wou'd be found to be ſuch as will be hereafter deſcrib'd.

Likewiſe in theſe Parts that were once healthful or ſound, Diſeaſes may ariſe of an ill Structure or Conformation, if the ſmalleſt Solids nouriſh amiſs, or are ill apply'd, and indeed Particles added to the Subſtance, Figure or Solidity of a Body may grow wrong; but a ſickly Contrariety ſeems again to have only theſe Diſeaſes as are now deſcrib'd.

Organick Diſeaſes.

BUT where a certain Part of the Body compounded of innumerable Parts, performs an Action from the Motion of the Fluids, which ſhould be done by the Function of its Inſtrument, or any other Office from the Strength of its Conformation, then it may be regarded in it ſelf, as a ſolid Part, or as to the Humour contain'd therein: If the firſt is allow'd, then the Diſeaſes call'd Organick, are moſt aptly examined under theſe four *Claſſes.*

Firſt, The Violation or Injury of the Figure, either in the internal or external Superficies, as alſo in Accidents of either, as to Roughneſs, Smoothneſs, Straitneſs or Crookedneſs, Laxity, Denſity, Cavity, Solidity, which are call'd Diſeaſes of an ill Conformation.

2ly, As to Numbers in Exceſs or Defect.

3ly, Increaſe or Diminution of Size.

4ly, Situation, Connexion, and from hence, Exceſs or Deficiency of Motion.

But the Superficies it ſelf being firſt ſound, but afterwards hurt or broken, conſiſts either in the different Union of the compounding Part, or in the Diſeaſes of the Humours offending there.

Foraſmuch as the *Superficies* forms Cavities, that make *Paſſages*, *Sinuſſes*, *Receptacles*, it may offend or tranſgreſs in Number, from whence ſometimes Diſeaſes are either from the extraordinary, large or ſmall Size of the Cavity.

If the Natural Capacity of the Cavity encreaſes too much, or a new one be formed, there ariſes a threefold Miſchief or Inconvenience, which is call'd ἀναςόμωσις, διαπήδησις, διαίρεσις, : In the firſt, the Mouths of the dilated Cavity, emit what is retain'd in them : In the next, the Parts conſtituting the Membranes are ſo divided, that the *Interſtitia* gape ſo wide, as to let what ſhou'd be contain'd there quite through : In the laſt place, there happens a true Separation of the cohering Parts; from whence theſe Species of Diſeaſes deſerve to be remembred, frequently ending in one *Diareſis*, and ſometimes reſtoring themſelves; but theſe are beſt explain'd from Mechanicks.

The Strength or Force of the Fluid encreaſing, the Veſſel is too much enlarg'd as to its Capacity, and forms Diſeaſes which are injurious and offend in ſecerning, excerning and caſting the matter through.

In leſſening of the Cavity, there is ſuppos'd to be five ſeveral Species; firſt, the ἔμφραξις, or Stoppage of the Cavity, by a viſcid, thick, grumous, inflammatory, calculous, ſandy, purulent, adipous matter, ſhutting inwardly the very Cavities of the Veſſels. 2ly, ςενοχωρὰ, or a Narrowneſs of the Paſſage, when a Tumour riſing in the proper Subſtance of the Membrane, conſtituting the Cavitty, binds up and ſtops the *Meatus*. 3ly, θλίψις, or a Compreſſion of the moving ſides, when ſome external Cauſe ſqueezes the Membranes too and again to the Veſſels, it leſſens its Cavity by degrees, and at laſt perfectly takes it away. 4ly, *σύμφυσις*, When the Sides of the Cavities forming either to the *Thlipſis* or the *Emphraxis*, ſo entirely coaleſce, that the whole inward Capacity is loſt. 5ly, *συνίζησις*, From which they are call'd empty Veſſels, having their ſides falling together, from the large Diſtenſion of their Tone by ſome morbid matter; and to this we may refer the too great Contraction of the Veſſels, by a force that exceeds the Strength of their Orbicular Fibres.

But an organick Part rarely errs as a Diſeaſe, in exceeding the Number; except from thence, a wounded Action follows; but often labours from a Defect that ought to be number'd or reckon'd as a Diſeaſe.

But a morbid Size in an Organick Part, is frequently reckon'd as ſuch, which alſo is faulty as well in Exceſs as Defect. The firſt, comprehends Tumours, *ὑπερσαρχώσις*, Nodes, Tophes, *Exoſtoſes*; and this may be often aſſign'd to the Narrowneſs of the Cavity about the ſtrait Ends, and the Dilatation in the middle, or to the *κακωκυμίαν*, *ἐκκύμωσιν*, *διάρεσιν*; but the latter thereof is preſent, where the required Size of the Part is leſſen'd in Action; and the Conception thereof is confirm'd in the *Atrophy*, and *Phthiſis*, a Waſting, Conſumption and Mutilation of the Part.

Laſtly, a Diſeaſe of the Organical Part conſiſts of an ill Compoſition with other Parts; which is lodg'd in the Situation and Connexion, in which the Motion or Want of Motion of the Part is contain'd: To this Diſeaſe therefore belongs the broken Figure of the Parts knit together, the too great ſhortning of the united Ligaments; the faulty Elongation of them, their Laxity or Rigidneſs; at laſt a Diſa Diſruption, a Want of requiſite matter amongſt the Parts joyn'd together, or elſe a Depravation, or Fault in what is preſent: Diſtortion, Laxation, Sublaxation, which there happen upwards, downwards, forwards, backwards, inward, and outward, from thence deriving many Names to them, which are uſeful to the Underſtanding thereof, and their various Diſtinctions. *Umbilical Hernia*'s, and ſuch as are in the *Groin* and *Scrotum* in Men; *femoral Hernia*'s in Women, as likewiſe thoſe of the Caul, Inteſtines, Air and Water; the Falling down or the Deſcent of the Womb and ſtrait Gut, the ſtarting out of the Muſcles and Tendons from their proper Places; the Looſneſs or Rupture of the Membranes, Bands, that retain the Joynts or Bones in their due Situations, are very pertinent Diſeaſes in this Place, the Underſtanding of which are highly neceſſary in the general Deſign of Medicine.

And there is a Diſeaſe common to the ſolid Part, that is ſimple as well as organical: Which is ſimply call'd *Solution* of *Continuity*, if made in a ſimple Part; but if in an Organick a compounded one, it is variouſly denominated, from the Nature of the Part, the Diverſity of the Cauſe, and Difference of the Application: To this relates *Wounds*, *Fiſſures*, *Punctures*, *Contuſions*, *Ulcers*, *Corroſions*, *Dilacerations*, *Ruptures*, *Fractures*, *Exfoliations*, *Caries* of the Bones, a *Spina Ventoſa*, &c.

The Diſeaſes of the Fluids or Humors.

THat the Diſeaſes of the Fluids may be rightly underſtood from hence, and digeſted into an exact Order, we are to know the Functions requiſite in them, or thoſe Things which are univerſally neceſſary to every diſtinct Liquor; or elſe the particular ones adapted to the human Species, or laſtly, thoſe ſecret ones, which conſtitute the Nature or Diſpoſition of each particular Man. The Univerſals are ſuch as make up the Minuteneſs of Parts, which eſcape the naked Senſe, ſo ſmall an Endeavour on a mutual Contact, as ſcarcely can be exceeded in the minuteſt ſenſible force, that Lubricity of the *Superficies*, that ſcarce amount to a Change or Alteration amongſt each other: But in Reſpect of human Nature there are many Things happen, that have different Functions, from whence ariſe many different Diſeaſes.

All which Diſeaſes may yet be eaſily reduced to a Vice in Quantity or Quality, if the Fluids are regarded in themſelves.

But if they are conſider'd as they are coerced in the definite Solids, then they are found to err firſt of all in Place or Proportion.

That Abundance or Quantity of good Humour which hurts the Functions, is call'd a πληθώρα, which is underſtood in a good Senſe of the chylous matter, or that call'd *Hæmatopoieſis*, which flows together with the ſlender Expenſe of what is exhal'd, theſe are deſcrib'd as to what is made by the Veſſels or their Strength.

That Scarcity of good Humour, which injures the Functions is rarely to be met with, except ſome external Force ſuddenly produces it, when there is an ill Diſpoſition or Temperament of the other Juices in the Fluids.

That Quality of the Humours which hurts the Functions, is call'd κακοκυμία or a *Cachochymia*, a depraved Habit, which is reſident in the Fluids, as they regard the compounding Parts, together with the Maſs of Fluids, or conſidered with the whole Subſtance of the Fluid together, as a Part concurring to make up the human Body.

If the morbid Diſpoſition be conſider'd in every particular Particle of the Humour, that will be fix'd either in the encreas'd or leſſen'd Subſtance, or in the greater or leſſer Solidity of the Particle; or it will conſiſt in the Figure, as well in its Rigidneſs, Flexibility or Elaſticity, various Coheſion, or laſtly, in its Diviſibility.

The *Idea* of the increas'd Subſtance in the Parts of the Humours, ſhows by the Unpaſſableneſs of them an ἔμφραξιν, in the leſſer Veſſels an *Atrophy*, &c.

The *Idea* of the Subſtance decreaſing, in the Parts of the Humours ſhows the διαπνοὴν and the κενεαγγέιαν to be too great.

The Encreaſe of Solidity if conceived in the Parts of the Humour, there is to be underſtood too great Strength that changes the Solids as well as Fluids, and likewiſe that there is in the ſolid Parts an ἀναστόμωσις, a διαπήδησις and a διαίρεσις; but in the Fluids too much Attenuation and Attrition.

If the Solidity appears too much diminiſh'd, there is an Unactiveneſs to be conceived, as well in the Veſſels as in the Fluids, hence comes Reſt, and ſoon after Coheſion.

A Particle of Humour errs from its own Figure, when receding from a ſperical Nature, it takes upon it an angular acute one; hence applying its whole Motion to a ſmall Part, it becomes acrid; theſe Receſſes are various, but commodiouſly reſtor'd or renew'd: Firſt, To an Acrimony meerly call'd Mechanical, where all remaining the ſame, the Figure only is form'd into ſolid acute Angles. 2ly, To an Acrimony call'd *Saline*, which is firſt, *muriatic*, *Ammoniac*, *Acid*, *Alcaliſate*, *Fix'd*, *Volatile*, *Simple* and *Compound*. 3ly, To an oleous one, which is that of Oil attenuated into Spirits or Oil, as it were burnt, by too much Attrition, of a Saline Oil, an Earthy Oil, an Acrid one, as compos'd of the burnt, ſaline and terreſtrial together. 4ly, To a ſaponaceous Acrimony, ſuch as is to be found in the poiſonous Parts of Animals and Vegetables. 5ly, To the Acrimony compounded of the four preceding ones, as alſo that which ariſes from the eating of Acrid Things, as from Vitriols and Metallick Bodies.

But that Diſeaſe is very grievous, and the Humour ſcarce curable, if the Particles thereof are ſo rigid, that they cannot be maſter'd or overcome by the Strength of the human Body, neither can they be divided or figurated into little proper Parts. But the ſame being too changeable in their Figures are morbid; for by the Evenneſs of their Superficies, they grow together by increaſing their Contacts.

And a Diſeaſe is as obſervable in the too elaſtick Parts of our Fluids, becauſe that conſtantly changes all the *Compages* of the Humours too much, upon the leaſt Change of Heat or compreſſive Motion.

Nay too firm a Coheſion of Subſtance in every Particle is ill; for ſo it hinders the Production of the leſſer ſmall Subſtances out of the greater, which are yet ſo neceſſary to a perfect State of Life: On the contrary, too eaſie a Diviſibility is hurtful; for that is repugnant to the Conſtancy of Health and Life.

And thus it is that Diſeaſes are of the greateſt moment in the Science of Phyſick, and the underſtanding the *Baſis* thereof, the beſt *Pathology*: Yet they can ſcarce be underſtood, except from an accurate Obſervation of their Effects, which may be made in ſick Bodies; from whence it is plain we can beſt ſee the morbid *Idioſyncracy* of the Humours.

But if you will behold all the Humours together, you may find the Diſeaſes of them to be particularly, either too great Fluidity, or too great Thickneſs, the firſt paſſing with too great Motion thro' the Veſſels, or the latter too inclinable to Reſt; or elſe laſtly, ſome Diſeaſe compoſed of Vices already enumerated.

And there are notable Diſeaſes that ariſe from the ſame continued Humours; but are render'd morbid only from the Change of Place; of which there are Two *Claſſes*: Firſt, If the Diameters be too much increas'd in the Veſſels, the groſſer Humours are received in ſtraiter Channels, which by degrees grow narrower. 2ly, If the Veſſels by any means be broke, the Humours iſſue out, and are collected in the *Interſtitia*, made from their Diſtenſion into the ſolid Parts of the Body; from whence we may underſtand the Riſe of *Inflamations*, true or baſtard *Aneuriſms*, and *Enchymoſes*, &c. as alſo *Oedema's*, *Puſtules*, *Dropſies of the Head*, *Breaſt*, *Belly*, *Womb*, *Ovaries*, *Teſtes*, *Scrotum*, *Peritonæum*, and thro' the Habit of the whole Body, from a peccant or vitious *Lympha*; as likewiſe an *Emphyſema* from the Air.

But theſe ſtagnant Humours, collected and affuſed, putrefying by Heat and Reſt, grow purulent, ichorous, corroding and acrid; they deſtroy the young tender yet ſolid *Stamina*, from whence they make *Sinus's*, *Fiſtula's*, *Ulcers*, *Gangreens*, *Cancers*, and the like.

But theſe are the primary Differences of Diſeaſes, taken from the very Nature of them, which, tho' they are ſo fertile in producing the greateſt Share of other Diſeaſes, they ſcarce deſerve to be number'd amongſt the Cauſes of Diſeaſes.

But it hath obtain'd its Uſe among Phyſicians, that beſides they diſtinguiſh Diſeaſes from ſome external Accidents, which tho' they are common to many very different ones, yet have their Diſtinctions, and a celebrated Uſe in Phyſick, tho' they are too much multiply'd with ſubtil Diviſion; therefore the following particularly have left out ſeveral.

Firſt, by reaſon of the Cauſe they are ἰδιοπάθεια, συμπάθεια, πρωτοπάθεια, δευτεροπάθεια, hereditary, conate and acquired.

Secondly, By reaſon of the Subject, they are Diſeaſes of Age, as of Infants, Youth, Adults, old People, Diſeaſes of the Sexes Male and Female, of Virgins, Women, with Child, Parents and Nurſes; then ſuch as are univerſal and particular.

Thirdly, By reaſon of Time, the acuteſt Diſeaſes are ſuch as terminate within Four Days; the peracute within Seven; the acute within Twenty Days; all the reſt are *chronick*; whereof ſome are vernal or autumnal, continual or without Intermiſſion, moderate or temperate and intermittent.

Fourthly, By reaſon of their Effects; ſalubrious, benign, malign, curable, incurable, mortal and contagious.

Fifthly, By reaſon of the Condition or State of the Diſeaſe, its Beginning, Progreſs, Extremity, Decreaſe and End.

ʼΑΙΤΙΟΛΟΓΙʹΑ ΠΑΘΟΛΟΓΙΚΗ῀Σ;

Or, Pathological Aitiology.

THE Cauſe of a Diſeaſe is call'd that which makes the Diſeaſe Preſent, and is ſcarcely always real; or it really produces a new State in the Solids and Fluids, which is the Diſeaſe it ſelf; or it takes away that which is altogether requiſite for the Exerciſe of its Function.

If that pre-exiſts any-how in the Body before the Effect produced, it is called internal; but if exiſting without the Body, from thence apply'd to it, it produces a Diſeaſe call'd external.

The internal ones frequently hurt the Humours firſt of all, then the ſolid Parts; the external ones chiefly affect the Solids firſt, and after that the Fluids; except by chance ſome few poiſonous and contagious Diſeaſes.

The *proximate* or neareſt Cauſe of a Diſeaſe is call'd all that together, which makes up the whole immediately preſent; this is always intire, perfect and ſufficient for the Diſtemper, whether ſimple or compound: This being preſent, plants and continues the Diſeaſe, but abſent, it is removed; but is almoſt the ſame *Ens* or Being exiſting in the whole, and is chiefly neceſſary in the moſt uſeful Enquiry.

The *remote* or diſtant Cauſe of a Diſeaſe, is call'd that which ſo changes the Body, that it makes it fit to receive the Diſeaſe, if any elſe be added to it; therefore it is not at any time perfect, or ſufficient to produce any Diſeaſe of it ſelf; neither can that Addition to it alone effect it, but both together; therefore Medicine directs, that both ſhou'd be eradicated at the ſame time: Both theſe united make the *proximate Cauſe.*

The remote Cauſe inherent to the Body, is call'd *προηγουμένη*, or a Diſpoſition before-hand; as for example, a Temperament or Conſtitution of Body as to hot or cold, *Plethora* or *Cacochymia*; a vaſt Abundance, or Depravity of the Fluids.

The Cauſe which approaches, or is added to the *remote*, excites that ſo, that they make a Diſeaſe together, call'd the *Procatartick*, or *πρόφασις*, by ſome the *Occaſion*; it is injurious by Pre-diſpoſitions only as it makes ſuch a Diſeaſe; ſometimes it is internal, ſometimes external.

Theſe latter the moſt commodious of all and moſt apt to aſſiſt the Memory, may be reduced to Four Claſſes chiefly uſeful, which are,

Firſt, The things received or convey'd into the Body; Air, Meat, Drink, Medicine, Poiſon, which are introduced by the Spiracles of the Skin and Noſtrils; by the Paſſages of the *Mouth*, *Lungs*, *Gullet*, *Stomach*, *Inteſtines* or *Pudenda*; from a viſible or inviſible Species, from a Fume or Vapour, a Draught, Clyſter, and what is infus'd into the Body.

Secondly, Geſtures; the Motion of the whole Body or a Part, and the Affections of the Mind; Reſt of both kinds whether ſleeping or waking.

Thirdly, The things retain'd; Excretions whether ſalubrious, or Recrements whether they be morbid.

Fourthly, External Applications to the Body; as Air, Vapours, Fomentations, Baths, Cloathing, Liniments, Ointments, Emplaiſters, Wounds, Bruiſes, Cauſticks.

Which are otherwiſe divided into Six *Claſſes*, under the Title of the *Six Non-naturals*; Air, Meat and Drink, Motion and Reſt, the Affections of the Mind, Retentions and Excretions, Sleep and Waking; enjoying this Name, becauſe by the Uſe or Abuſe of them, they may be made naturally good, or unnaturally bad: They may be reduced under theſe Heads, bnt it will be more convenient and proper to make uſe of the precedent Diviſion.

The Air, when too hot, diſſipates the Moiſture of the Eyes, Noſtrils, Mouth and *Aſpera Arteria*, there it dries up the Veſſels; it thickens the Blood in the Lungs; from either of which Cauſes it hinders their Actions, exciting many Diſeaſes that ariſe from thence; it carries off the external Humours that are always thinner, and exhales the Reſidue within; it diſſipates the more agile Parts, and collects together the ſlower, which it unites and dries; therefore it daily leſſens the aqueous, ſpirituous, volatile, ſaline Parts, but on the contrary, increaſes the fix'd, ſaline, oily, groſs, tenacious, acrid, earthy ones, which it accumulates and unites together into indiſſolveable Maſſes; hence comes the Impaſſableneſs of the Humours, together with the Weakneſs of the Solids, and what follows from thence, to wit, Obſtructions, Dryneſs, Inflamations, Stoppage of Digeſtion, Putrefaction, Coſtiveneſs, Thirſt, Strangury, red Urine, yellow Jaundice, acute, hot and dry Diſeaſes; and firſt of all, theſe Actions principally injure the *Lymphaticks*, and the *Genus nervoſum.*

A cold Air ſhortens, thickens and ſtrengthens the ſolid Fibres, hence their Actions increaſe the Fluids; but where they thaw again, it deſtroys and diſſolves the Fibres; the ſame cold or chilling Air, binds and thickens the Humours, dries and ſtraitens the Lungs, coagulates the pulmonary Blood, from whence come Obſtructions, Inflamations, Difficulty of Breathing, Coughs, Catarrhs, Mucus, Pus, Gangreens; but if the Body is mov'd ſtrongly together, then the Action of the Solid, is ſo increas'd into Fluids, and that of Humours into Liquids, that it makes the greateſt Attenuation, Perſpiration, Voracioufneſs, Weakneſs, Fainting of the Spirits and ſudden Death; if on the contrary, Reſt, and the utmoſt Coldneſs in the Air brings on Stupidity or Numbneſs, exceſſive Pains in the Limbs, and the Scurvy to the laſt degree.

If the ſame Air be too moiſt, it relaxes, diſſolves and weakens the Fibres, and firſt the pulmonary ones; retains the *Serum* in the Lungs, increaſes and gathers it together, hindring Perſpiration therein; from whence come Coughs, *Peripneumoniæ's*, *Diarrhoea's*, Sleepineſs and Fevers; if great Heat be join'd to it, ſudden Putrefaction, if great Cold, a ſerous Flux of Rheum.

A dry Air produces almoſt the ſame Effects, with too great Heat, the Air being too heavy, compreſſes all the Canals and Fluids of the whole Body, but eſpecially in the Lungs, from whence it gives too great Reſiſtance to the Heart, ſuffocates the Motion of the Humours, and kills.

So, if it be too light, it dilates by a leſs Preſſure the Veſſels, and rarefies the Humours; hence come Tumours and Eruptions of the Humours which create Diſeaſes; then the contractile Force prevails, the Dilatation is reſiſted and overcome in the Pulmonick Fibres; whence Reſpiration is ſtopt, the Blood is there accumulated, there is an acute *Peripneumonia* and Death it ſelf.

The Heaven, the Seaſon of the Year, the Earth, Sea, Mountains, Lakes, Fens, Rivers, Vapours, Exhalations, Meteors, give ſuch a Change to the Air, that it creates various Diſeaſes, not depending ſo much on the Diſpoſition of the Air, and of its Functions and Qualities, as on the Nature and Efficacy of the Mixture; from whence therefore they ought to be inquired into and underſtood.

But Winds act upon our Bodies, either by their Motion, or as they convey to us ſome Qualities of the Air; it is impoſſible to tell thoſe things of 'em, that will quadrate with every Seaſon and Climate, but the chorographical Knowledge of a Place, the Neighbourhood of adjacent Parts of which is ſeen by us, compar'd with the Seaſons of the Year, may afford us ſomething real and advantagious; in like manner from a certain ſucceſſive Series of what follows, we have often remarkable Effects; for firſt they act as hot, cold, moiſt or dry; hence they alter the Solids and Fluids.

Meat and Drink may offend in the Production of Diſeaſes, either in Quantity or Quality; if they act amiſs in Quantity, they effect this in exceſs or defect.

If they offend in too great Plenty, the *Stomach* is too much extended, hence ariſes a *Convulſion* from cloſing the Orifice thereof, its Veſſels are compreſs'd, Dilution, Digeſtion, Contrition, Separation and Expulſion are hindred; from whence come *Dyſpnoea's*, a perverſe Circulation of Humours, Crudities, Ructations, Nauſeating, Heartburn, Vomiting, Putrefaction, Vertigo, Confuſion of the Senſes, a Cachexy,

chexy, all which Vices being once rais'd, are hardly corrected in the following Functions.

But if it be defective from an abſolute Want, which is indeed a mere Defect, it produces nothing of it ſelf, but then in the interim of time, they waſte and deſtroy the ſolid Parts of the Body that maintain the Actions of Life, they diſſipate the ſubtil fine Fluids, and inſpiſſate or thicken the remainder; by a conſtant repeated Attrition they diſſolve the Oils and Salts, extricating the volatile acrid Parts that corrode the minute and tender Veſſels, putrefy the Humours, pollute the Breath, hence comes a ſaline Spume, which is acrid, bilious and putrid in the Stomach firſt, and then in the Inteſtines; Ructations or Belchings, Loathings, Faintneſs, an outragious or devouring, and afterwards a Dejection or intire Loſs thereof, unquenchable Thirſt, Dryneſs, Weakneſs, Gripes, Plenty of Gall, Vomitings, Leanneſs, Watchings, Epilepſies, violent Fevers and Death.

From whence it is evident, that too much Abſtinence creates worſe Diſeaſes than too much Repletion, and the Vices of the former are much more difficult to cure, than thoſe of the latter, agreeable to *Hippocrates.*

But thoſe Vices which lodge in the ill quality of Meat and Drink, may commodiouſly be apply'd to Acrimony, Viſcidity or Oilineſs: The Acrimony of the Meat and Drink is firſt ſaline, but this is muriatic, naturally acid or fermenting; the firſt raiſes Thirſt, Hoarſeneſs, Roughneſs, Dryneſs, Rigidneſs, an Acrimony eſpecially in the ſerous Humours, a like Diſſolution of the Fluids, an Unaptneſs of the ſerous *Lympha* to Nutrition, a Deſtruction of the minuteſt Solids, corroding Pangs, and *Scurvy.* The other which is a ſimple *Acid*, or for the moſt part *ſour*, aſtringes, incraſates, coagulates, firſt of all creating an acid Acrimony, excruciating

Pains, Heart-burn, Paleneſs and Scabs; which more particularly lodges in Summer Fruits that are not fully ripe. Laſtly, the third is in acid Wines or Vinegars, which produces the like Miſchiefs, but not ſo grievous; from hence by the too frequent Uſe of theſe things, an acrid acid *Serum* is produced, the conſequence of which are *Rheumatiſms* and *Gouts.*

In the ſecond place, there is an acrimony in Meat and Drink which is aromatick, as chiefly conſiſting of Salt and Oil united with Acrids; this makes Thirſt, Dryneſs, Heat, Burning, ſtimulating the Solids, and giving a ſwift Motion to the Fluids; hence come Heart-burning, Heat of the Stomach, Loathing, Belching, Vomiting, Fevers, Waſting, Contractions, and other Diſeaſes depending thereon.

The Third is an acrimony prepared from a ſpirituous Fermentation, increas'd by time, being raiſed by Diſtillation to the higheſt degree, as that in Wine, old Beer and diſtill'd Spirits; this produces Thirſt, Drunkenneſs, a dry Conſtriction of the Fibres, a Coagulation of the Humours ſcarce reſolvable, the quickeſt *Stimulum* and ſudden Loſs of the ſolid Parts; hence there is the greateſt neceſſity of pouring on the like ſort of Liquor, from whence ariſe Weakneſs, *Flatus* or Wind, Obſtructions, Fevers, Tumours, Dropſies, a *Leucophlegmatia*, and the like Evils.

Laſtly, in the fourth place is found, a penetrating fermenting Acrimony, which is in the Crude Muſt of Summer Fruits in Wine or Malt Drink, but in the very Act of Fermentation, by ſhutting the Veſſel cloſe is ſoon ſuppreſs'd; this creates Ructations, Wind, Spaſms or Contractions of the Stomach and Guts, Vomitings, Cholicks, Diarrhea's, Dyſenteries, Iliack Paſſions and the like.

But too great Viſcidity of Meat from unfermented Flower, or from the Gelly of Animals, as well as from tough Cheeſe and hard Curd, generates a

Weight in the Stomach, Wind, Crudities, Obſtructions of the ſmaller Veſſels in the Inteſtines, hence come an Unactiveneſs of the Guts to Motion, a Swelling and Hardneſs of the Belly being bound; as alſo from the ſame cauſe a viſcous quality in the Blood from the united glewy Particles thereof, hence Obſtructions at the Glands, Paleneſs, Sluggiſhneſs, Cold, Tumours.

But too much Oilineſs, lubricates, relaxes and weakens the Solids; obſtructs the Mouths of the little Veſſels; hence it hinders the Paſſage of the aqueous Fluid, depraves the Mixture of the Humours, excites or raiſes the burning nitrous Acrids; from which proceed Ructations, Loathings, and bitter oily Vomitings; then it occaſions exceeding Thirſt, Obſtructions, Inflamations, Indigeſtions of the *Viſcera*, and many Miſchiefs ariſing from thence.

Too much Motion throughout the Body, or in any particular Part, always increaſes Contractions, and reciprocal Relaxations of the *muſcular Villa*; and likewiſe a Celerity in all the Humours; hence the Fluids and Solids by too much Attrition are diſſolved; the aqueous, ſpirituous moveable Parts are ſcatter'd or diſpers'd; the reſiduary Humours changed into an inflamatory Thickneſs; in the mean while, the Oils and Salts being too much attenuated, ground, made volatile and acrid, are as it were exalted into Corruption; the groſs and tenacious Oils are accumulated; the Humours are as it were burnt or ſet on Fire, eſpecially that of the Bile, the Marrow is conſumed; the little Cells are fill'd with *Ichor*, a Leanneſs or Conſumption is made; hence Wearineſs, Pain, Inflamation, Fever, Suppuration, Gangreen, a Hemorrhage and ſudden Death. But if this happen in a *Cachochymick* Body, or one labouring under a Conſumption of any of the *Viſcera*, and eſpecially if in the Height of Summer, it is quickly mortal.

Too much Waking conſumes the Spirits, ſo that they are to be repair'd by no Art, but Sleep; it dries up the reſt, grinds the Solids, eſpecially thoſe fine ones of the Brain, increaſes the Acrimony, hinders Concoction and Nutrition, exaſperates the Bile; hence there is a Production of Fevers, Delirium, *&c.* Generation of Melancholy, Agitation, Evacuation, Sadneſs, a deprav'd Imagination and perpetual Inquietude.

Too much Reſt of the Muſcles throughout the whole Body, or in a ſingle Part, renders the muſcular Fibres unfit for Motion, leſſens the Celerity in all the Fluids; hence comes Concretion Unactiveneſs as well of the Fluids, as of the Principles that conſtitute them; a Repletion of the Cells, a Collection of Marrow, Fatneſs, *Leucophlegmatia*, Coldneſs, Sleepineſs, Slowneſs; from whence are known the Effects of Idleneſs, and a ſedentary Life.

Too much Sleep conſumes the volatile Parts, and by degrees thickens the Reſt; it collects thoſe things into the lateral Veſſels, and ſcarce moves them; it retards the Excrements, it loads the Brain, fills the Head, and dulls or ſtupifies the Senſes; hence it becomes hurtful to thoſe who are inclinable to it, beyond others, and is advantagious to ſuch as are addicted to Waking.

The Affections of the Mind that are violent or continue long, wonderfully and forcibly change and deprave the Brain, Nerves, Spirits and Muſcles, from whence they are capable of producing almoſt all ſorts of Diſeaſes, and ſupporting or maintaining the Strength of them, according to their Diverſity and Duration.

Too large an Excretion of *Saliva* diſturbs the firſt Concoction, and after that the following; it procures Thirſt, Dryneſs, Melancholy, Conſumption and *Atrophia*; but if it is not excern'd into the Mouth, or much leſs than uſual, then it hinders the

Manducation of the Victuals, Taſting, Swallowing, Digeſtion, and likewiſe increaſes Thirſt.

Too large an Excretion of *Bile* or *Gall* by the ſuperior or inferior Parts, deſtroys the making of *Chyle* in the firſt Inſtruments; hence it hinders the Concoction of Victuals, the Secretion and Excretion of *Fæces*; produces an acid Temperament, Cold, Weakneſs, a *Leucophlegmatia*, Fainting; but if it ſtops what is made from flowing into the Cavity of the Inteſtine, creates *yellow Jaundice*, together with the foregoing Vices.

The *Lympha* of the *Pancreas* and Inteſtines, if too much of it be driven into the Guts, produces the like Miſchiefs as when the *Saliva* is faulty in like manner; as alſo *ſerous Diarrhæa's* at firſt, from whence proceed the greateſt Weakneſſes, Faintings of the Spirits, Dryneſs, Thirſt, Hectick Fevers, and a *Maraſmus*. If it flows not into the Inteſtines, or that very ſlowly, then it makes thick and compact Subſtances in the Guts; hence come Weight, Repletion, Gripes, Twiſting of the Guts, Thirſt, Fever, hard Stools, Tumors, *&c.*

Too plentiful an Excretion of Blood; whether it be made by *Anaſtomoſis* from the Liver, Inteſtines, Kidneys or Womb, or by a *Diaireſis*, *Diapeſis* or Wounds; it takes away the Strength, ſinks the Spirits, deſtroys all Actions, accumulates crude, wat'ry, cold Humours; produces a *Leucophlegmatia*, Dropſy, a Relaxation in all the Veſſels, and an Enlargement of the Arteries: But the Blood by the Hemorrhoidal Veſſels or the natural Courſes of Women, or other accuſtom'd Places that formerly us'd to flow periodically or otherwiſe, being now intercepted, makes topical and dire Inflamations, Suffocations and Stoppage of Circulation, Fevers, wonderful and various kinds of Diſeaſes; but eſpecially very ſtrange Hemorrhagies in other Places.

Too large an Excretion of the *Semen* produces Laſſitude, Weakneſs, Inability to Motion, Convulſions, Leanneſs, Dryneſs, Pains in the Membranes of the Brain, Heat, eſpecially of the Eyes, Dulneſs, Conſumption in the Back, Fooliſhneſs, and ſeveral other Diſeaſes bordering on theſe.

A Superfluity of *Urine* makes Dryneſs, ſtops the Paſſage of the Humours, produces Heat, unquenchable Thirſt, Crudities, a Subduction or Lowneſs of Spirits, Leanneſs, *Atrophy*, and the like Miſchiefs; and too much Sweat effects almoſt the ſame thing; but a Suppreſſion of Urine weakens the Bladder, Ureters and *Pelvis* of the Kidneys, and intirely deſtroying their Texture by diſtending, corroding and putrefying the ſame, it forms an alcaliſate Acrimony throughout the whole *Lympha* of the Blood; hence by injuring the tender *Stamina* of the Brain, it brings on Sorrow, Heavineſs, troubleſome Sleep, *Vertigo's*, *Apoplexies*, &c.

Too great abundance of *Sanctorius*'s Perſpiration makes the greateſt Weakneſſes, hence ariſes a *Deliquium* or Fainting, and at laſt ſudden Death; but if this be very ſlow or ſuppreſs'd, it makes the Veſſels of the outward Skin dry and wither, hence proceeds Obſtructions of the larger Secretions; the Circulation is alter'd, the acrid Parts are there retain'd, from whence ariſe Putrefaction, Crudity, Fevers, Inflamations and Apoſtems.

Cold Externals being apply'd, ſhut the *Meatus's* or Paſſages, and contract the Fibres, driving back what was retain'd there and hinder their Exhalation, by which means they effect what the impeded Perſpiration had occaſion'd. Moiſt or humid things waſh the Excrements, open the Mouths of the Veſſels and relax them, inviting the Humours to the outward Parts, whence if they exceed they produce the ſame Diſeaſes, as too much Sweat: Dry things act the contrary way; whence we may underſtand the Uſe of Baths, Fomentations, *Epithimums* and the like, if we firſt know the Matter, Quality, *Modus* and Time of Application.

There are ſeveral internal things ſo general to the Body, that many Diſeaſes depend on them as their Cauſes; from whence they are propoſed in the general Enumeration of Cauſes, and are wont to be explain'd by their Cauſes; and theſe are a *Plethora, Cacochymia* and internal heterogeneous Matters.

A *Plethora* is made, ſupported and increas'd in the Body, whoſe *Viſcera* are capable of making plenty of *Chyle*, whoſe ſanguiferous Veſſels are lax, and who eat Victuals of good Nouriſhment, are of a middle Age, of a ſanguine Conſtitution, whoſe Minds are unemploy'd, and who enjoy a competent ſhare of Reſt. This produces intolerable Heat and Motion, an Extenſion of the larger Veſſels, and a Compreſſion of the leſſer; hence upon the leaſt occaſion given, there is a Laceration of the Veſſels, a Suffocation of the Liquids, and a lazy or ſloathful Unactivity.

A *Plethora* may be conſider'd, either in thoſe things which happen to the Humours extrinſecally, or in thoſe which adhere internally in them, and then again, either in all together, or in any particular.

Therefore where it happens, that there is firſt too great a Motion of the Humours thro' the Veſſels, that make a Compreſſion, Attrition, Attenuation, Heat and an inflamatory *Diatheſis* of the Humours; and conſequently the ſame Diſeaſes as have been already explain'd from too much muſcular Motion: But the Motion being too ſlow, produces the direct contrary. Firſt of all there is a dangerous Motion, either from the exceſs or want of the nervous Spirits, from whence all Concoctions, Secretions and Excretions are hurt, and from thence are produced Diſeaſes almoſt of all kinds.

But too great a Fluidity of the Humours, produces too much Exhalation or Expence, Conſumption, a diſturb'd Secretion, a Conſtriction of the larger Veſſels, Emptineſs and Weakneſs of the ſame; Obſtructions, Ruptures, and Suppurations in the leſſer; which are hurtful in the firſt place, if too great Acrimony and Motion attend together.

But too great Tenacity of the Humours brings forth Obſtructions, Extenſion of the Veſſels, Pains and Tumors, firſt at the Glands, and then at the Arterial Unions: But where an Acrimony is likewiſe join'd to that Tenacity, then according to the different proportion, with which theſe Two meet together, there is chiefly made a Deſtruction of the Veſſels, from whence the Humour being pour'd out, there follows Puſtules, Inflammations, *Gangreens*, *Cancers*, Itching, Ulcers, a *Caries* and the like.

Crude, acid Humours, ſour, vinous, fermenting Acids, chylous and milky ones, together with volatile and fix'd Alcalies, alſo muriatic, armoniac Salts, the ſaline, oleous aromatick Acrids, produces the like Diſeaſes as proceed from the Vice of the Aliment, which always contain ſome of theſe Principles therein.

A yellow *Bile*, like the Yolk of an Egg, being often rais'd by its own Motion, from a Convulſion, a Diſturbance of the Mind, or from ſome other Cauſe ſcarce yet diſcover'd or explain'd, produces many and thoſe grievous Diſeaſes, as Loathing or Abhorrence of Food, *Grief*, *Hiccups*, *Heart-burns*, *Iliack Pains*, *Colicks*, *Gripes*, *Wind*, *Irructations*, or *Belchings*, *Diarrhæa's*, *Dyſenteries*, acute Diſeaſes, *Fevers* and *Convulſions*.

But black or melancholy *Bile* call'd ſo from its Colour, and nam'd *Bile* from its Situation where it is collected, and from whence it is ſecern'd; being ſometimes of the Taſte of the ſharpeſt Vinegar, but ſometimes like that of putrefied Blood, it corrodes, burns and ſcours, exciting Inflammations, *Gangreens*, *Sphacelus's*, the moſt afflicting and bitter Pains with enormous Effervеſcencies; three ſorts of which are deſcrib'd in the Cauſes of Diſeaſes, the firſt is from the mildeſt or beſt Subſtance of the Blood, too much agitated or put into too violent a Motion: The Second is from this firſt matter being more and more exaſperated by the ſame Cauſes: The Third is from a corrupted or putrefied Bile, which if it ariſe from the yellow, yolky, eruginous Gall, it is always the worſt, and that according to the variety of its Diſpoſition, and the nature of the Part into which it is depoſited, various Effects are produced.

The *Blood*, *Serum* and *Bile*, if they are join'd with a predominant Acid. Alcali or muriatic Salt, Oil or Earth produces Diſeaſes, that are agreeable to ſuch as demonſtrably ariſe from theſe things.

The *Serum* of the Blood, *Bile* and *Urine*, generate from their own matter, Stones that are compounded or made up of a volatile Spirit, Salt, Oil and an Earth from them, united together after a certain manner.

But theſe by extending in Subſtance, Weight and Motion, compreſs the neighbouring or adjacent Parts, and alſo the Veſſels embracing the Stones in their Motion, by the Preſſure of their Subſtance againſt hard, ſharp or rough Bodies, they are broke in pieces and deſtroy'd; hence the Paſſage of the Humours is intercepted, Pain is created, *Inflammations*, *Ulcers*, *Gangreens*, *Calloſities* and the like Evils, which depend thereon.

The Eggs of *Inſects* that are received or taken into the Body with the Air, Meat or Drink, being mix'd with the *Inteſtinal Pituite* or *Mucus* and with the *Fæces*, lodging in the Cavities, by Warmth and

Reſt and Heat, at laſt Worms are produced, ſome of which are round or flat or ſuch as are call'd *Aſcarides*, and ſometimes theſe are ſwallow'd down with the common Aliment, from whence growing by degrees, they become familiar and inherent in the Body.

But thoſe by ſucking moving about, vellicating and corroding the Guts and conſuming the *Chyle*, irritate the Nerves, wound the Solids, and procure *Nauſeas, Horrors, Cardialgia's, Vomitings, Faintings, Leanneſs*, a *canine* or voracious Appetite, Swelling of the Belly, *&c.* eſpecially Wind and ſudden Tumors.

An external or internal Force of the moving Bodies, hurts or injures the ſimple Parts of the Body in every Action call'd mechanical, as hath been obſerv'd; neither can it be imputed to Heat, Cold, Moiſture or Dryneſs, the Chymical Principles, acrid, alcali or acid.

The Matter or Body of the Diſeaſe ſubſiſting in a grieved Part, being ſuddenly collected is call'd *Fluxion*, but ſlowly gathering together is a Collection; according to the Cauſe, it owns the Sluggiſhneſs of the ſolid Part not overcoming or expelling that which it began to form, or the Derivation of the preſent matter erring in the Part, which is now poſſeſs'd or inclos'd.

This Derivation, Fluxion, or Attraction call'd by the Antients, is made with Motion, Heat and Pain; and hence Diſeaſes ariſe which are call'd with Matter.

Poiſons, the Plague, contagious things howſoever received, hurt the Solids and Fluids, or both together, ſo that the Courſe or Circuit of the vital Humours is ſtopt; they always indeed act by a mechanical Power, but oftentimes ſcarce to be underſtood or ſufficiently explain'd, except by the Principles of the Chymiſts. It is eaſy to conceive how they hurt the ſolid Parts by reſolving them too much, relaxing, conſtringing and obſtructing; but they deprave the *Fluids* by inſpiſſating or thickning them too much, and rendring them acrid; hence both together are broken by this united Labour; and therefore they are chiefly ſwifter in the Nerves, Lungs and Blood; from whence theſe Diſeaſes thus generated, were call'd by the Antients, *Diſeaſes of the Decay or Loſs of the whole Subſtance.*

And there are certain particular Cauſes of particular Diſeaſes, which give riſe to an ill Conformation of Parts, as the Imagination of the Mother, an imprudent Action of the Midwife, or Negligence of the Nurſe or Keeper; for by this means the tender Body of the Infant, being ſqueez'd, handled, bound or ſwaddled, is ſo deform'd, that afterwards it is hardly to be remedied.

So likewiſe there are evident Cauſes of the Cavity, being vitiated in the ill Diſpoſition of the Parts, whether internal or external; but the Origin of a *Diareſis* is from Extenſion, Acrimony, or external force.

A ſtrong Compreſſion, a forcible Separation, the Relaxation or Diſſolution of the Ligaments, or binding Membranes, produce Laxations, Contorſions, *Hermia*'s or *Ruptures*, and a deſcent or falling down of the Parts.

Cuts, Pricks, Wounds, Burns, Bruiſes, Contuſions, Corroſions, &c. are particular or ſpecial Cauſes of the Solution of unity.

ΣΥΜΠΙΩΜΑΤΟΛΟΓΙ΄Α ΠΑΘΟΛΟΓΙ΄ΑΣ
Symptomatological Pathology.

THat Preternatural Thing which from the Diſeaſe, as a Cauſe is made ſo in the ſick Body, that it can be diſtinguiſh'd from the Diſeaſe it ſelf, and from the proximate Cauſe of it is call'd σύμπτωμα, the Symptom of the Diſeaſe, but if from the ſame Reaſon, it flows from the Cauſe of the Diſeaſe, it is call'd the *Symptom of the Cauſe,* but where it is produced from another *prior Symptom,* as its Cauſe, it is call'd σύμπτωμα συμπτώματος, but that which may be over and above added to the Diſeaſe, from a different Origin from the former, is rather call'd ἐπιγέννημα ἐπιγινόμενον. συμβεβηκός.

The firſt Claſs of theſe is diſpos'd according to the Series, or Order of Actions decay'd, leſſen'd, deſtroy'd, increas'd and deprav'd; from whence occurs an Explanation of the *Symptoms* of the Appetite upon Meat and Drink. Therefore δυσορεξία, is a decay'd Appetite, ανορεξία, the ſame loſt or deſtroy'd; ἀποσιτία, an Abhorrence or loathing of Victuals; βούλιμος, ὄρεξις, κυνώδης, Increaſe of Hunger or a canine Appetite, κίσσα, μαλακία, call'd *Pica,* a deprav'd longing Appetite or Deſire to ſuch Things as cannot be turn'd into Nutrition.

The Cauſes of theſe *Symptoms* are frequently found to be in a ſluggiſh viſcid Flegm, where the *Bile* is wanting, there is a Suppreſſion of the ſaline matter, and a Relaxation or *Paralyſis* upon the Fibres: So likewiſe they proceed from the Putrefaction of the *Sordes,* a watry Diſpoſition of the Blood, Fatneſs, Idleneſs, an Acid, Saline, bilious Acrimony, Worms in the Stomach or Guts, the too great Strength of the Fibres, continued Motion, a ſharp Humour predominating, an Alteration or Change of the Blood's Circulation, deprav'd Imagination, eſpecially in breeding Women.

An unſatiable Deſire of Drink and too great Thirſt, us'd to ariſe from exceſſive dryneſs, from the Thickneſs of the fluid Humors, from too much Heat, from a Muriatic, Armoniac, Alcaline, Aromatick Sharpneſs, or biting Quality, or laſtly from Poiſons.

Manducation or *Chewing* is injured from the vice or defect of the Mouth, Tongue, Teeth, Jaws, *Saliva* or Spittle and Muſcles, which may be occaſion'd by Wounds, an Inflamation, Palſy, Spaſm or Contraction and Dryneſs.

Swallowing is hurt likewiſe from an Impediment of the Mouth, Tongue, Palate, Glands of the *Tonſillæ*, the *Uvula*, *Larynx*, *Pharynx*, Gullet and upper Orifice of the Stomach, and this happens by Wounds, Inflamation, Pain, Spaſms, Palſy, Dryneſs, a χονδρογγυίαν, or a Laxation of the Parts of the *Larynx* or the *Vertebræ* of the Neck, and the Want of *Mucus.*

The firſt Species of the Action of the Stomach being hurt, are ἀπεψία, δυσπεψία, βραδυπεψία, διαφθορὰ, when the Contents of the Victuals are not digeſted either in the Stomach, or elſe too ſlowly and with difficulty, or they are chang'd from good *Chyle* into a contrary putrid Humor: The Cauſes are the ſame almoſt as the ἀνορεξία; but principally the Deficiency and Unactiveneſs of the *Saliva* of the Mouth and Stomach, the languid Organs of Inſpiration; the *Sordes Worms* and Flux of putrid Humours; but a quick Digeſtion the reſt being good is ſeldom a Diſeaſe or the Cauſe of one.

But the Faults of Expulſion from the Stomach are reckon'd to be *Hicups*, *Nauſeating*, *Vomiting*, *Choler*, *Ructations*; the firſt of which is as may be ſeen, a Convulſion of the *Oeſophagus* or *Gullet*, drawing up the *Ventricle* and the *Diaphragm*; while the *Diaphragm* is likewiſe ſuddenly puſh'd down again; the Cauſe whereof is found to be a ſudden ſwallowing of too much at once; abundance of eating or drinking, Acrimony contain'd in the Stomach, an Inflamation of the *Oeſophagus*, *Ventricle* and *Septum Tranſverſum*,

verſum, a *Spaſm*, from too much Evacuation or an Exceſs of vomiting and ſharp Poiſons.

Nauſea, or *Loathing* and *Vomiting*, ſeem to be retrogade, ſpaſmodick Motions of the Muſcular Fibres of the Gullet, Stomach and Guts; likewiſe ſtrong Convulſions of the Abdominal Muſcles and the *Septum tranſverſum*, which moving ſlower, provoke a Loathing, but more violently vomiting. But theſe are made from too great Plenty or the Acrimony of the Aliment, from Poiſons, Wounds of the Brain, Contuſions, Compreſſions, Inflamations; from an Inflamation of the *Diaphragm*, *Stomach*, *Inteſtines*, *Spleen*, *Liver*, *Kidneys*, *Pancreas*, *Meſentery*; from an Irritation of the Gullet, from a diſturb'd Motion of the Spirits, by muſical Agitations or in a Coach, Ship, *&c.* from an *Idea* of ſomething, whereby they are provok'd to loathing and vomiting.

But the Expulſion of *Choler* violently moved upwards and downwards, from the Stomach and Guts, is a Convulſion creating a Vomit, and ſo likewiſe a ſtrong *Spaſm* of the Inteſtines downwards, great devouring of Summer Fruits, and hot Weather in the Month of *Auguſt*.

Belching is an Exploſion of the elaſtick matter, by a convulſive Contraction of the Fibres of the *Oeſophagus*, the Stomach, the Inteſtines compreſs'd, and afterwards from a Reſolution they are ſet at Liberty again; but this proceeds from Crudity, Corruption, Sharpneſs, Summer Fruits, Muſt, fermenting Liquors, Poiſons, Spaſmodick Diſeaſes, and all kinds of Acrimony.

But a violated Expulſion of the Stomach and Guts is alſo to be met with in λειεντερία or *Lientery*, which is a ſudden Expulſion of the Aliment by Siege or Stool, which being receiv'd into the Stomach, had not yet had time to be chang'd and turn'd into Nouriſhment; the Cauſe of which is the Sluggiſhneſs or Unactivity of the Humours, as in the ἀνορεξία and ἀπεψία, as alſo the greateſt Laxneſs of the Ventricle and Inteſtines; while at the ſame time Reſpiration is pretty ſtrong.

If the *Chyle* be caſt out together with the *Fæces* by ſtool, it is call'd a Cæliack Affection; where the Stomach and Humours ſeem to concur, as ſufficiently powerful for a conſtituting Cauſe, while the Inteſtines are too lax, or the Mouths of the lacteal Veſſels from ſome Cauſe or other are obſtructed.

A *Diarrhea* is a frequent and plentiful caſting out of liquid Excrements by ſtool; whether ariſing from Meat or Drink, or any other Humours contain'd in the *Guts*; the Cauſe whereof is either ſome acrid matter that irritates the *Inteſtines*, expreſſing or ſqueezing out the Humours from the Hepatick, Pancreatick, Meſenterick or Inteſtinal Veſſel, while the Mouths of the Meſenterick and Lacteal Ducts are ſhut, or elſe it is a great Laxneſs of the Inteſtinal Fibres; and laſtly, an Impediment or Hindrance to the other Excretions.

A *Dyſentery* is a *Diarrhea* with remarkable Pain, the matter of which is the ſame with that of the *Diarrhea*, but more ſharp and acrid, abounding beſides with *Bile*, *Serum*, *Blood*, *Inteſtinal Mucus*, *Pus*, *Sanies*, *Fibres*, *Caruncles* and *Membranes*; from whence it hath the ſame Cauſe but more violent, which frequently from the Acrimony of the Humours occaſions an Inflamation, Ulcer or Gangrene of the Inteſtines or other Parts.

What we call the Iliack Paſſion, is a violent Rejection or caſting up of whatever is taken by the Mouth, whether as Meat and Drink, or under the Denomination of Medicine, together with a Diſcharge of *Chyle*, *Bile*, the *Serum* of the *Stomach*, *Pancreas* and *Inteſtines*, *Melancholy Bile*, *Mucus*, *Pus*, the *Fæces* of the Guts, *&c.* The proximate Cauſe of which *Symptom* always appears to be the inverted Motion of the Fibres of the *Inteſtines*, *Stomach* and *Oeſopha-*

Oeſophagus, happening together with ſome other Cauſe that may provoke to vomit, but the remote Cauſe is an *Inflamation*, *Apoſtems*, *Scirrus*, *Cancer*, *hard Fæces*, *Stone Hernia*, *Convulſion* and *Twiſting of the Guts*; from theſe Effects the Retenſion of the harder *Fæces* is underſtood in its Origin, Cauſe and Nature.

But if the Generation and Excretion of the *Bile* into the Inteſtines, be interrupted or diſturb'd, theſe *Symptoms* firſt ariſe, *yellow Jaundice*, a *Bilious Cachexy*, *Stone* and *Gravel* in the *Liver*, *Obſtructions*, white, hard and dry Excrements by Stool, the Mixture of what is eat and drank is impeded; there is a *Tympany* and a *Dropſy*, for its Cauſe it freqnently owns the Inflamation, Dryneſs and Obſtruction of the Liver, or of the Humours contain'd therein, and the *Abdominal Viſcera*, and the Inſpiſſation or thickning of the Fluids thereof.

But if the *Lympha*, of the *Pancreas*, *Liver* and *Inteſtines*, be injur'd in the making or Motion thereof, ſuch like *Symptoms* ariſe as we mention in the *Diarrhea*, becauſe their Cauſes are alike.

The change of the Blood in the Heart, is according to the *Modus*, the Reception, Slowneſs or Expulſion thereof; which if too great, as to Motion, produces continued, burning, ſtrong Fevers; but being much ſlower, and the Expulſion ſtill more languid, then follows a weakneſs or decay of ſtrength, *polypous Concretions*, cold, *Leucophlegmatic Dropſies*, and ſeveral other Diſeaſes proceeding from hence.

A violated Action of the Lungs, as well that which ſerves for Reſpiration, as that for Tranſmiſſion of Blood, conſiſts firſt, in the Increaſe or Decreaſe of its Efficacy on the Blood; from the firſt ſeems to ariſe διάθεσις φλογιστικὴ and *inflammatory Affection*, from the latter αἱματοποιήσιος an *Impediment of Sanguification*, and that of Nutrition; from whence ariſes a κακεξία, ἀτροφία, φθίσις, that is a *Cachexy*, *Atrophy* and *Phthiſick*, with infinite other Miſchiefs; but the Cauſe of that injured Action is every Vice or Fault of thoſe Multiplicity of Organs, which ſerve for Reſpiration.

The *Symptoms* of the Secretion of Urine being interrupted are chiefly theſe, firſt, ἰχȣεία *Iſchuria*, to wit, a total Retenſion of the Urine that is not at all excreted, the firſt Cauſes of which are a *Plethora*, an Inflamation of the *Reins*, *Ureters*, *Bladder*, Neck of the Bladder and *Urethra*, a Spaſm and Preſſure of the ſame Parts; as alſo an Obſtruction from a *Stone Pus*, *Gravel*, *Caruncle*, *Apoſtem* and *Tumour*,

The Second, is δυσȣεία a *Dyſury*, or too great an Excretion of Urine with Trouble, Struggling and Pain, a Species whereof is call'd ςεαγγȣεία or the *Strangury*, where the Urine is emitted drop by drop, with a Senſe of Heat; the Cauſe of either Evil being manifold, to wit firſt, from the Acrimony of new fermenting Malt Drink, Wine or the *Fæces* or Sedement of either, Acid, Salt, Alcaline, Oleous, Aromatick or Bilious Humours; the Excoriation of the Parts of the Bladder or *Urethra* from Inflamation, or ſome *Ulcer*, from the grinding of a ſharp or rough Stone, the taking of *Cantharides*, &c. a Stone or Tumour fix'd in the Neck of the Bladder, or the *Urethra*.

Thirdly, Incontinence of *Urine*, which happens when that flows of its own accord, without the conſent of the Will, or the aſſiſtance either of that or Reſpiration: It proceeds chiefly from a Reſolution of the Parts conſumed by Separation, or from a *Gangrene* putrefying the Fibres of the *Sphincter* of the *Bladder*.

Laſtly, the Fourth is διαβήτης a *Diabetes*, with a frequent and plentiful paſſing through of chylous or milky Urine: The Cauſe whereof is ſuppos'd to be too great a Relaxation of the Fibres in the urinary Arteries concurring together with the Humours very much diluted; both which proceed from watry Blood.

But an injur'd vital Action regards chiefly for its *Symptoms*, the Pulſe of the Heart, the Exerciſe of Reſpiration, or both together; ſo that therefore firſt of all, the Palpitation of the Heart is reckon'd, that which is call'd a violent Contraction thereof, together with a great Reſiſtance of Blood puls'd from the Heart, the Cauſe of it is oftentimes an inordinate and violent *Impetus*, of the vital Spirits on the ſides of the Heart, as in the greateſt Paſſions of the Mind, ſudden Fear, Hyſterick Affections, a ſudden and violent Motion, precipitate waking; ſometimes it is an Irritation of the Fibres of the Heart, made from a certain acrid *Stimulum*, as in the *Cachochymia*, the Inflamation of the Heart and *Pericardium*; or from theſe Diſaffections, Stone, Worms, Hair, an *Aneuriſm*; thence from thickned or congealed Blood, a *Polypus*, at length from cartilaginous or bony Arteries, or from theſe obſtructed at their Extremities.

2ly, The intermitting Pulſe of the Arteries happens, either from the ill Diſpoſition of the Liquid of the *Cerebellum* unequally flowing into the Heart, or from the Fault of the Veſſels tranſmitting the Blood and Humours; or elſe laſtly, from the vitiated Humour which flows thro' the Veſſels; from whence the Cauſe of this Miſchief is various, as *Convulſion*, *Polypus*, *Cachochymia*, an Arterial, Pulmonick or Cardiack *Inflamation*, a Deficiency of Blood, the Arteries being bony, cartilaginous, ſubject to *Aneuriſm*, or ſtopt with a Stone; or elſe the Heart having an ill Conformation from a different Cauſe.

A frequent Pulſe always ariſes from a quick Syſtolick Contraction of the Heart; but this is from a more frequent Influx of the Spirits of the *Cerebellum*; and a more difficult Progreſs of the Liquor expell'd; whereby they become acrid and obſtructed.

The Diminution or leſſening of the *Pulſe*, which is reduced to a λειποθυμία, or a ſinking of the Spirits, where they are ſo weak that they are ſcarce able to ſupport the Body ; a λειποψυχία is a Defection of the Animal Spirits, when they fail ſo, as to deny the Aſſiſtance of the Natural Heat ; the συγκοπὴ is where the Heart ſo deficient, that Heat, Motion and Senſe are almoſt loſt, and is attended with cold Sweats ; ἀσφυξία is a Privation or Want of Pulſe, ſince no Artery appears to move; and where all is loſt as to Senſe, and they look like the Image of Death : The various Cauſes of theſe *Symptoms*, conſiſt in the various degrees of them ; as firſt, horrid *Ideas* of a Thing, Sorrow, Affections of the Mind, Spaſms, eſpecially in ſuch as ſuffer a great Loſs of Blood, as in *Child-bearing*, *Abortion*, &c.

An interrupted Reſpiration or difficulty of breathing, reckons its firſt *Symptoms* to be firſt, an ἄπνοία a total Deprivation of Breath, or where it intirely ceaſes, and places its firſt Cauſe in the *Lipothimia*, or ſinking of the Spirits, alſo it hath regard to a vitiated Air, poiſonous Vapours, cauſtick, acid and auſtere Bodies : A *Palſy* or *Spaſm* of the Organs of Reſpiration, deſtroys altogether the Function or Uſe of theſe Parts.

2ly, A Δυσπνοία or *Dyſpnœa*, in which Reſpiration is made with Trouble, Pain, and Labour, this is of the ſame Nature with the former but lighter, whereby it renders the Conformation of the Breaſt worſe than the reſt.

3ly, An ᾿Αθμα or *Aſthma*, which is a frequent, troubleſome Wheaſing Kind of Breathing ; often proceeding from an obſtinate *Dyſpnoeæ*, but chiefly as it appears from a ſpaſmodick Conſtriction of the Muſcular Fibres in the *Lungs*.

4ly, An ᾿Ορθοπνοία *Orthopnia*, which is a ſtoppage or difficulty of breathing, with the Neck erect, and the Breaſt at Liberty, proceeding from the ſame

Cauſe with the others, but acting and receding by various Inſults or Attacks.

5ly, A ſuffocating *Catarrh*, which ſeems as if it would kill inſtantly, and is call'd ἀπνοία or a ſtrangling, this hath the ſame Origin as the reſt, but is more frequent or common; for from the inflam'd matter, there is a ſudden Diſtillation falls, upon the *Jaws* and *Lungs*; this is often obſerv'd to proceed from the greateſt diſorder of the Nerves, and a large *Polypus* of the Heart thruſt into the *Lungs*.

But all theſe *Symptoms*, appear to be produced from ſome remarkable Cauſes, by examining of dead Bodies; as firſt, the Repletion of the *Thorax* by extravaſated *Lympha*, *Pus* and *Blood*; likewiſe the Inflamation of the *Larynx*, *Aſpera Arteria*, *Bronchia*, *Lungs*, *Pleura*, *Mediaſtinum*, *Diaphragm*, and Muſcles of the Breaſt ſerving for Reſpiration, as thoſe of the *Abdomen*; and ſo from the different matter of a *Polypus*, *Flegm*, *Chalk*, *Gravel*, *Stones* and *Pus*; together with a Tumour about the *Larynx*, and in the *Lungs*, whether inflammatory or ſeparated, a *Scirrhus* and *Cancer*; and at laſt an Adheſion of the *Lungs* to the *Pleura*.

The numerous *Symptoms* attending the Diſeaſes of Sight or the Eye, are taken from the Enquiry into their Cauſes, according to the Diverſity of Situation; for firſt, the coercing or binding Parts affect the Eye by preſſing the Bulb thereof, Protruſion, Extruſion, Corroſion, by inflam'd *Tumours*, *Apoſtems*, *Scirrhus*'s, *Cancers Exoſtoſes*, a *Caries* of the Bones, forming the *Orbit* of the Eye: From whence the Figure thereof, the Humours, Circulation, Sight, Axis, and Collection of the Rays, are deprav'd and looſe their proper Office.

From hence alſo, the *Eye-lids* being inflam'd, ſeparated, inflated, conglutinated and concreted, wonderfully diſturb the Sight, from ſeveral different Cauſes;

Cauſes, but chiefly and moſt frequently by the ill Habit or Diſpoſition of the *ſebacious or ſewet Glands.*

So likewiſe from too great Plenty of Tears, that are ſharp and thick, ariſing drop by drop at the Edges of the *Eye-lids*, whence they diſtill from the Eyes upon the Cheeks; theſe troubleſome Fluids diſturb the Sight, cauſe inflammatory Conſumptions of the Part, Dimneſs of Sight, and what we call *Fiſtulæ Lachrymales.* Thoſe Things happen by reaſon of too great a Laxneſs of the *Lachrymal Gland*, or from the Acrimony and too much Motion of the lachrymal Subſtance, and perhaps from the ill Configuration of the Palpebral *Tarſus*, or from a various Diſpoſition of the little Mouths of the *Eye-lids*, that abſorb the Tears, and of the Pipes that convey them into a lachrymal Bag; therefore howſoever they recede from their Natural State, the Channel of the Noſe, or the Membrane that inveſts the Noſtrils within, whereby they hinder their Paſſage out by this Canal into the Cavities of the Noſtrils, they err, and are in an evil Diſpoſition.

Hence the Viſion is deprav'd, impeded or loſt, by darkning, or obſcuring and thickning the *Tunica Cornea & adnata*, whence comes an *Oedema Phlyctena*, Inflammation, a Nail, Pearl, Cicatrix, white Speck or Cartilage; all which may happen from various and different Cauſes.

When the *aqueous Humour* is wanting, there is a flagging of the Eye and the *Cornea* becomes wrinkled; if it abounds or exceeds, there is a protuberant or elephantine Eye, if it ſtagnates, by not being recruited, but putrefying, the whole Fabrick of the Eye ſinks, if it takes a Colour or thickens, whether into the Nature of *Mucus* or *Pituita*; hence ariſes Suffuſions and Cataracts, theſe are for the moſt Part betwixt the inward Membranes of the *Uvea* and the ſmooth *Chryſtalline*; and the Cauſe is chiefly an

Inflammation, *Cachochymia*, or too imprudent Application of coagulating Things.

If the *Uvea* is inflam'd, there ariſes a very painful *Opthalmia*, moſt pernicious to the Sight; if it is ſeparated, the Quickneſs and Sight is loſt; if it be immoveable and contracted, there ariſes an ἡμεραλωπία, which makes that they can only ſee at full day, and happens where the *Cataract* is leſs, thinner at the Edges, and thicker in the middle; but if motionleſs, and yet very open or broad, then there is a νυκταλωπία or an Owl-light Sight.

It is certain, that the *Opace Chryſtalline Lens* being inflam'd, ſeparated, hydropick, decay'd and conſumed, produces a *Glaucoma*, a *Cataract*, *dull Sight*, and a clowdy Blindneſs call'd ἀμβλυωπία, or a heavy obtuſe Sight; but if the ſame is injur'd, in its Figure, Subſtance, Thickneſs, or Thinneſs, it will create many, various, and thoſe often wonderful ill Accidents to the Sight.

Nay the too ſpherical Figure of the prominent Bulb, and alſo the Smallneſs of the *Pupilla*, and many other Conditions hitherto leſs clearly beheld in the length of the Eye, may produce in the *Lens* it ſelf and its Situation a μυωπία, or ſhort Sightedneſs; as on the contrary in a flatter Eye, from the various Diſpoſition of the *Lens* and its Situation, may ariſe a πρεσβυωπία or a diſtant Sight.

The Membranes of the *Retina*, by means of their many different Veſſels, can produce great variety of Accidents, as *Dropſy*, *Oedema*, *Phlyctena*, Inflammation and Compreſſion; and ſo of the optick Nerve, and the Membranes that incloſe: Then a *Tumour*, *Steatoma*, *Abſceſs*, *Hydatides*, *Stones*, Inflammations, Corruptions and Obſtructions may ſo happen to the Brain, that a free Communication is ſtopt betwixt the optick Nerve, and its Origin in the medullary Part of the *Cerebrum*, or elſe is intirely deſtroy'd; all theſe by different ways ſtrike the Organ with an

Imagination of Flakes and Motes dancing before the Eyes; this is call'd ἀμαύρωσις a Dimneſs of Sight and a *Gutta Serena.*

A *Palſy* or *Spaſm* of the Muſcles that move the Eye, the Diſtractions or various Contorſions ariſing from the Bones of the *Orbit* ill diſpos'd, as alſo Wounds, Ulcers, Inflammations and Compreſſions, may produce the ῥινοπτίαν, or *ſquinting Eye,* and ſuch like ſtrange Diſaffections.

At laſt, the *Tunica Choroides* of *Ruyſch*, and the *Uvea* abounding with Blood Veſſels, are very lyable to Inflammations and Separations, ſo that they eaſily produce an ὑπόπυον or Suffuſion; and from the various Diſeaſes of the different Parts in the Eye, frequently occaſion Confuſion of Sight, Dimneſs, and at length Blindneſs.

The firſt *Symptoms* that are reckon'd in the Diſeaſes of the Ear, are an Increaſe or Decreaſe, a taking away or a deprav'd *Hearing*.

In the acuteſt Diſeaſes of the *Brain, Nerves,* and *Membranes*, it appears in theſe, as if too tenſe, or too much ſtretch'd, that there frequently ariſes almoſt an intollerable ὀξυηκοΐα, Acuteneſs or Quickneſs of hearing, affecting the Brain ſtrongly with the ſmalleſt Sound, and exciting, ſometimes convulſive Motions.

That is call'd, βαρυηκόϊα or a *thick, dull hearing,* when the Perception of the Sound is leſs than the Size, that is requir'd in Health; but it ariſes from very many and thoſe various Cauſes, commodiouſly ſituated according to the various Places affected; for the external Parts of the Ear may be too plane or flat or taken away; the *Meatus Auditorius* too ſtrait or narrow, obſtructed with ſome Tumour, with *Inſects, Pus, Sordes* or concreted Wax: The Membrane of the *Tympanum* may be wounded, relaxed, callous'd, or cover'd with a fungous, ſpungy, thick Cruſt; the internal *Concha* may be fill'd with *Ichor, Pus,* or

Flegm, with Tumours of the Membrane inveſting that on every ſide; *Euſtachius Canal* may be ſtopt or obſtructed from the falling in of Duſt or the like, after the breaking the Membrane of the *Tympanum*, the *Oſſicula* looſ'd or broke off from its Connexion, and carry'd thro' the *Meatus*, or from the Separation of the little Membrane, as it often happens after cruel inflammatory Pains of the internal Ear, or when the *Oſſicula* is wanting by reaſon of an ill Conformation of the Part: So likewiſe Dryneſs Relaxation, Thickneſs, an Inundation or overflowing of Moiſture, too great Tenſion, Corruption or Induration of the little round Membrane of the *Feneſtra* and *Ovalis*, the *Veſtibulum*, *Labyrinth*, *Cochlea* and *Meatus* of the *Os petroſum*, the various Vices, Inflammations, Obſtructions, Palſies, and thoſe which may derive themſelves from thence as from their Cauſes, and alſo the contrary of them from the Structure of the hearing; laſtly, from every Impediment whereby the ſoft Auditory Nerve may be ſtopt or hindred in the middle way, from its Entrance into the *Os Petroſum*, even to the *Medulla oblongata*, or hence, even to the Origin in the *Medulla* of the Brain, as *Inflammations*, *Tumours*, *Exoſtoſes*, a wounded Function of the *Cerebrum*, and many Diſeaſes beſides, from whence we may find the difficult Reaſon for the Cure of them.

Likewiſe from the Vice of the external Ear, chiefly the humid, and cloudy, or that of the internal, not having free Paſſage in or out, there happens a depraved Hearing; firſt of all, theſe little Arteries are damag'd, which ſupply the ſmall Membranes that are diſpers'd every where, in the whole Organ of Hearing, from whence is eaſily underſtood the Reaſon of the tinckling, humming, murmuring, ſtill Noiſe in the Ear.

If at length all theſe Vices continue to increaſe, then ariſes a κώφωσις, or *perfect Deafneſs*; from whence proceeds the Ignorance or Forgetfulneſs of ſpeaking; the Cauſe whereof is often a Concretion of *Euſtachius*'s *Tube*, and frequently in the Venereal Diſeaſe from the ulcer'd, rotten hollow Jaws, from thence by Reaſon of the Crudity of their Lips, united with the Concretes.

Smelling is alſo leſſen'd or quite loſt, ; firſt, from the Defect or Solidity of the four Spungy *Oſſicula* or little Bones, and the ſmalleſt caverns or hollows in the *Os frontis*, the upper *Maxilla*, and the *Os Cuneiforme*; 2ly, From the Dryneſs, Moiſture, Inflammation, Separation or Gangrene of the olfactory Membrane. 3ly, From the compreſs'd olfactory Nerves by certain Tumours created here with *Exoſtoſes* and *Polypus's*. 4ly, From Vices in the Brain to the Origin of thoſe Nerves, as hath been ſaid before in the other Senſes, it is alſo deprav'd from a ſtench of ſome matter, reſting upon theſe cavernous Places, and continually exhaling.

The *Taſte* is likewiſe diminiſh'd, taken away or deprav'd: The firſt Two of theſe will happen, if the taſting *Papillæ* of the Tongue be cover'd with a Cruſt, Foulneſs, Slime, Thruſh, Puſtules, Warts, Inflamation and Dryneſs, or an accidental Wounding of the Nerves, of the fifth Pair: But this Senſe is deprav'd from the Vice of the predominant Humour, firſt, that often ſticks in the *Saliva* pour'd into the Mouth, which erring in Taſte, produces here many Effects of a bilious, alcaline, acid, ſaline, æruginous, oily, ſaccharine, or cadaverous Nature.

The Senſe of *Feeling* us'd to be injur'd, firſt, by a *Stupor* or Numbneſs that was ſcarce perceivable, or at leaſt blunt or obtuſe, as it were by a *Medium* interpoſing; which happens from too great a coldneſs of the extream Organ, or from a Defect of the Nerve or Brain, as by an Interpoſition of ſome matter, unapt or improper to that Senſe; from thence in too acute a Senſibility, or perhaps from too much ſtretching and Softneſs of the Nerve together, likewiſe from a loſt Faculty of touching from any Cauſe, whereby the Nerves, Brain, or both, are render'd unapt for performing their Duty, as may be ſeen in the *Apoplexy* and *Palſy*.

Waking or *Watchfulneſs* riſes firſt, from too great a Determination of the Nervous Fluid, to the Organs of Senſe: 2ly, From too ſudden or violent a Motion thereof towards the Brain, the Inferior Parts being obſtructed by Cold, or any other Cauſe, as in hypochondriack, melancholy, mad Perſons, who are cold in the lower Parts. 3ly, From ſome Irritation whereſoever ſeated, that vellicates the Organs of Senſe, eſpecially the Brain. 4ly, From too great Motion of the Fluids, where the *Meatus's* or Paſſages of the Brain are open. 5ly, From Diſeaſes, in which theſe Things mention'd before, are predominant, as from *Fevers*, *Frenſies*, *Melancholy*, *Grief*, *Separations*, and the like.

But too much Sleep may ariſe from any Cauſe, that ſtops the free Flux and Reflux of the Spirits, from the *Medulla* of the Brain, by the Nerves to the Organs of Senſe, and of the Muſcles ſubſervient to the Will, and then again, from theſe to the Origin of theſe Nerves in the *Medulla* of the Brain: But this Cauſe is ſtill manifold, yet eaſily referr'd to a *Plethora*, *Obſtruction*, *Effuſion* of Humours, the *Compreſſion* or *Squeezing* of the Veſſels, *Inflammation*, *Separation*, *Gangrene*, *Slothfulneſs*, the Uſe of *Opium*, *Narcoticks*, *Aromaticks*, Fermenting, ſpirituous Things, too much apply'd to the Noſe, hard Meals, Fat, and to great Quantities lodging long upon the Stomach.

Κῶμα ἀγρυπνῶδες, *Coma nocturnæ Vigiliæ* is an unſurmountable Inclination to Sleep, with a perpetual and terrible Twitching in Sleep, which derives itſelf from the like Cauſes as the former, but is attended with a great Stimulation of the Parts, frequently proceeding from a violent Inflammation that happens to be join'd with it. Κῶμα ὑπνῶδες is a continued Sleeping, with as continued a Relapſe into the ſame Condition upon Waking. Κάρος, *Carus* is a profound Sleep with a ſudden Loſs of Senſe and Motion, together with an acute Fever and a Difficulty to be wak'd, this is but a ſlighter kind of *Apoplexy.* Λήθαργος, *Lethargus* or *Lethargy*, is a deep, quiet, forgetful Sleepineſs, proceeding from a ſlow, cold Cauſe, in many things much like the reſt, and frequently ariſing from the meeting together of ſeveral ſuch like Cauſes. A καταφορὰ differs ſcarce at all, or very little from the former.

Ἀναισθησία, a *Faculty* of perceiving the Actions of ſenſible Objects in the Organs of the external Senſes taken away, of which there are different degrees, Stupidity, Dulneſs, Confuſion ; the Memory more or leſs taken away or confus'd ; an imperfect Faculty of Judging, loſt or confus'd ; an imperfect Faculty of Reaſoning, loſt or diſturb'd ; *Delirium*, Folly, Madneſs, a depraved Imagination, and all Diſeaſes may be refer'd hither, that depend on many and various Cauſes, yet ſo that they may be properly derived from theſe, Age, Affections of the Mind, the Rigidity, Laxity, Concretion or Deletion of the Solids : The Thickneſs, Acrimony, Thinneſs and Unactivity of the Fluids, may be diſcover'd as the Principle amongſt others.

Ἀποπληξία, the *Apoplexy* is a ſudden and intire Loſs of the Senſes, external and internal, and alſo of all voluntary Motion, yet with ſome continuation of Breathing and a Pulſe ; its Cauſe is ſeated in the Brain, which hinders or ſtops the Flux of the Spirits, from the Origine of the *Medulla* of the Brain thro' the Nerves thereof ; this is many ways, and may be fitly enough refer'd to all thoſe which compreſs the Brain, outwardly or inwardly, being reducible to Five Claſſes. Firſt, *Fractures, Impreſſions, Exoſtoſes,* *Tumors, Compreſſions of the Cranium,* firſt of all, in Youth and Infancy, when it is yet ſoft and tender. 2ly, The Humours of Blood, Serum, Pus, Flegm, Sanies, either ſtagnating or pour'd out into thoſe Places, where they may be compreſs'd, or corrode the Brain and its Membranes; as betwixt the *Skull* and the *Meninges*, betwixt theſe and the Brain, in the Ventricles thereof, to the *Medulla oblongata* and *Medulla ſpinalis.* 3ly, Inflammatory, aqueous, ſerous, purulent, mucous, ſcirrhous, ſtony Tumors, in the ſame places, and ſubject to the ſame effect of Compreſſion. 4ly, Impediments from a Flux of Blood running to the Brain, eſpecially from a Fault of the Veſſels being wounded, compreſs'd or obſtructed from a *Polypus.* 5ly, The like Impediments riſing in the little Veins, *Sinus's* and larger Ducts, in which the ſanguineous Humour returns from the Brain; but theſe Impediments how great ſoever, proceed from the Compreſſion of the Veins,

Παράλυσις, a P*alſy* renders the flaccid Muſcles motionleſs, the Cauſe whereof is a Stoppage of the Influx of the Spirits into the Texture of the Muſcles, or of the Arterial Blood into its Veſſels; this happens from a Fault in the Brain, Nerves, the Muſcle it ſelf, or its Arteries.

Παραπληγία, is a Loſs of Motion of all the Muſcles under the Head, which have their Nerves from the *Cerebrum* and *Cerebellum*, iſſuing from under the *Cranium*; the Cauſe therefore chiefly lodges in the Fourth Ventricle of the Brain, or at the Beginnings of the ſpinal Marrow.

Ἡμιπληγία, *Hemiplegia* is the ſame Diſeaſe, but only that it ſeizes one ſide of the Body; hence the Cauſe is the ſame, but it derives it ſelf only from one ſide of the Brain, or the *Medulla ſpinalis.*

Παράλυσις, or the *Palſy* of a particular Part is clearly known; and therefore we underſtand, why in the *Apoplexy* there is likewiſe a *Paraplegia*, or at leaſt a ſtrong *Hemiplegia*? alſo why upon the removing of the *Apoplexy*, neither of theſe ſucceed, or if they do, they laſt not long.

Ἐπιληψία, the *Epilepſis* or Falling Sickneſs, is a ſudden and intire Deprivation or Loſs of the Senſes external and internal, and alſo of voluntary Motion, together with reciprocal and violent Convulſions, and a Return from them; from whence here ſeems to concur a double, and as it were oppoſite or contrary Cauſe, partly *Apoplectick*, and partly *Comatous*, acting by turns, but neither ſo ſtrong, nor continuing ſo long a time.

Λῖγγος, a *Vertigo* or Swimming of the Brain, making as if the Objects turn'd round, and a Trembling of the Limbs, proceeding from an Apoplectick Cauſe, but not ſo ſevere.

Σπασμὸς, a *Spaſm* or *Convulſion* is an unwilling, violent Contraction of the Muſcle, with the attracted Part alſo hanging to the Muſcle: The Cauſe ariſes from a ſtrong and continued Influx of the nervous Fluid into the Muſcle, of which there are infinite Cauſes in the *Blood*, *Arteries*, *Meninges*, *Brain*, *Nerves*, *Muſcles* and *Cranium*.

Τέτανος, or *Rigor*, is an involuntary, violent Convulſion, being diſagreeable to the bending and extending Part of the proper Muſcles, which is either univerſal of them all together, or ſingular of one certain particular Limb or Member.

Ἐμπροσθότονος, is a *Spaſm* of the Muſcles, bending forward the Head, Neck, Breaſt and Loins.

Ὀπισθότονος, is a *Spaſm* of the Muſcles bending backwards, the Head, Neck and Back; and it appears eaſy to prove, that the Cauſe of the latter is one and the ſame as that of the *Spaſm*, but more univerſal, and almoſt always ſubtil, ſharp and poiſonous.

Hence 'tis plainly evident, why a *Vertigo* and *Convulſion*, firſt of all being univerſal, the *Falling-ſickneſs*,

ſickneſs, if great and obſtinate, and from an internal Cauſe, almoſt always terminate at laſt in the *Apoplexy*.

A vitiated Quality of the Body, is call'd that which hurts or annoys the Diſpoſition, that extends it ſelf to, or mixes with the Senſes; but this is chiefly to be conſider'd as to *Colour* and *Smell*.

The Colour of the *Skin*, the *Cuticle*, the *Tunica adnata* of the Eye, the *Cornea*, Lips, Mouth, Tongue, Jaws and Caruncles of the Eye being pale, yellow, green, livid, red or black depends on the like Bodies, ſhining thro' the pellucid Veſſels, and as they are mutually received in a various Series or Order, and alſo claim different Cauſes, as appears in the *Phlogoſis*, or particular, Inflammation, *Gangrene* and *Sphacelus*.

The pale, red, yellow, black or brown Colour of the Bones, appears from a Contuſion, Inflammation, Abſceſſes, a morbid *Medulla*, the taking away of the *Perioſteum*, a *Caries* and *Spina ventoſa*.

But a Smell or Stench ariſes from ſtagnating, corrupted or venemous Humours, and that from every Cauſe which attenuates the Oils and Salts too much, and renders them too volatile, as Famine, Heat, too great Motion or Acrimony of what is eat and drank.

ΣΗΜΕΙΩΤΙΚΗ͂Σ.

The Semeiotical Part of Phyſick, being firſt General.

SInce a Diſeaſe is an Effect depending on its Cauſe, it is a particular *Ens* or Being diſtinct from all others, and therefore ought to be accurately underſtood in its own proper and ſingular Nature, that it may be cured; which will appear to be as neceſſary in *Health*, and the various State and Condition thereof.

But the preſent Nature of *Health*, or its Defect, a *Diſeaſe*, rarely appears in the Senſes by it ſelf, neiis it ſo conſpicuous by it ſelf, where being preſent in the Body, they may be known; but the reaſon of both frequently lies hid.

But from the Preſence of either, there are certain Effects depending, on the Exerciſe or Performance of the ſalubrious Functions, or on the Impediment of them: Theſe are indeed diſtinct from thoſe Cauſes, but yet ſo depend upon them, that they manifeſt their Nature or Diſpoſition, and ſince they are obſervable by the Eye of the Senſes, they may afford great Light to theſe Enquiries.

But beſides the Knowledge of the applying Cauſe obſerv'd in any Part of the Body, which in *Phyſiology* firſt teaches the known Nature of the Effect which follows from thence, whether that be ſalutary or pernicious or future; neither is it of great moment, whether this Cauſe be external, internal, natural, accidental, ſalutiferous, morbid or mortal.

Theſe related Effects furthermore, and the ſaid Cauſes foraſmuch as they are taken to be Senſibles, or how nearly deducted from thence, are call'd φαινόμενα, *Phænomena*, or *Appearances*; but theſe us'd to be call'd *Signs*, when from the Obſervation of them in Senſe, by the Law of right Reaſon is demonſtrated the Preſence, Nature, Condition and Event, as well of *Health*, as of a *Diſeaſe* and *Death*.

Thoſe things are called διαγνωστικὰ or δηλωτικὰ, when they declare or pronounce the preſent State and Condition. of the living Body, healthful, ſick or dying; but if they pronounce what ſhall happen hereafter, then they are call'd προγνωστικὰ, or *Prognoſticks*; but where they proceed, and at laſt come within the compaſs of our Knowledge, they are term'd by Phyſicians *ἀναμνηστικά.*

Bnt in Diſeaſes that declare, the Sign which is proper to the Diſeaſe and inſeparable from it, as ariſing from the Nature thereof, that is call'd *παθογνωμικὸν*, or the *Pathonomick Sign.*

Hence the Knowledge thereof is ſo highly neceſſary and uſeful, tho' often difficult in the Enquiry, yet it is always preſent in the Diſeaſe, as long as it keeps its natural Courſe, and is frequently manifeſt, when there is a Complication of ſeveral concurring Signs.

But thoſe Signs which teach us the Alteration and various Conditions of a Diſeaſe, are call'd by the Name of *ἐπιγιγνόμενα* or *Symptoms.*

The Efficacy of which is ſo powerful to the well-underſtanding and the Cure of Diſeaſes, that there is ſcarce any other that brings ſuch Advantage to the Practice of Phyſick, from whence alſo ariſe the greateſt Miſchiefs in the Neglect of them.

But ſince all theſe are Effects produc'd from the Cauſe of a Diſeaſe in the Diſeaſe it ſelf, and the *Symptoms* daily chang'd; therefore they obſerve in Diſeaſes the preſent Condition of its Matter at ſome certain time, which firſt produced the Diſeaſe, or of that which was produced from the Diſeaſe; wherefore they may be aſſign'd to theſe three *Claſſes*, which are

Firſt, Crudity and Digeſtion.

2ly, The Termination thereof in Health, a Diſeaſe or Death.

3ly, Secretion, Excretion and the digeſted matter, which are therefore call'd *Decretoria* vel *κριτικὰ* *Decretory* or *Critical.*

General Signs of the beſt State of Health.

THeſe ought to be expected or required from the Actions of the Body, being exerciſed with *Eaſe, Uſe, Pleaſure* and *Conſtancy*; The firſt Three of which Conditions may be found eaſy, but the Fourth more difficult; for the great Conſtancy is only known by thoſe Signs, which indicate that there will be a future long Life in that Body; and hence alſo from the ſame reaſon they frequently pronounce a firm State of Health.

But all thoſe Signs of long Life, are the Effects of the Diſpoſition or Nature of the whole Machine, as to the Solids aud Fluids, from whence in the firſt place the Durableneſs thereof depends as to the intire *Compages* or Structure; but this is the Reduction of the Aliment into the like nature with thoſe things that now make up the ſound Machine.

By the Aſſiſtance of a tedious Obſervation, theſe Signs may be reduced to thoſe *Claſſes*.

Firſt, To *Generation*; a Conception from healthful, vigorous Parents, of full Age, rarely uſing *Venery*, but that with Heat, and in the Morning after ſound Sleep, and in Spring time, that being chiefly ſalubrious.

2ly, To Bearing in the Womb; the pregnant Mother being ſound, uſing her Body to laborious Exerciſe, having a quiet Mind, and only carrying one *Fœtus* or Burthen in the Womb, that it may have Plenty of wholſome Food.

3ly, To the Birth, the Child being born after Nine complete Months from the firſt Conception, and eſpecially coming into the World in *December, January* or *February*.

4ly, To the *modus* or manner of the Body's Growth, it being ſlow and proportionable in every part, ſtill increaſing in Subſtance and Strength together,

gether, to the Twenty fifth Year of his Age and upwards.

5ly, To the Habit or Shape of the Body; a broad, large Cheſt, the *Abdomen* tight and ſmall, the Shoulders, Arms, Thighs and Legs ſtrong, muſcular and hairy; the *Cranium* large and capacious, eſpecially the *Occiput*, the Skin hard, and the Body fleſhy, but not fat.

6ly, To the Humors, a florid but thick Blood, which when extravaſated, is fibrous and ſtrong, and will ſoon congeal into a hard Subſtance, the reſt of the Humours ſhou'd be plentiful and tough, moderately hot, leſs oily and ſoft.

7ly, To the Actions; a ſlow, large, full, eaſy, even Reſpiration, with the leaſt apparent Alteration of the *Pneumonick* Organs; a ſlow, large, full, equal, ſtrong, conſtant or ſteady Pulſe of the Arteries, nor uſually changeable from a ſmall Cauſe, a ſlow Provocation to Stool, the *Fæces* being of a good conſiſtence with Inconvenience to the Body, little Urine but well digeſted, rare Sweats, ſound Sleep that is refreſhing, a greedy Appetite with eaſy Digeſtion, moderate Labour, a dull Genius and not too violent Motion of the Mind or Body, with a Conſtancy to accidental Changes.

But that the Fabrick of the Body may be fit to exerciſe its Actions eaſily, uſefully and pleaſantly, is to be diſcover'd, firſt, From the very Tryal of the Senſes. 2ly, If the Signs are preſent after the manner they have been explain'd. 3ly, If the ſolid Parts are found to be ſtrong, tough and elaſtick, as to the Matter of which they are formed; if they are knit together after ſuch a manner, in ſuch a ſituation and proportion, that the proper, as well as common Motions of the Body may be expeditiouſly and eaſily perform'd, as well in the Solids as the Fluids. 4ly, If that be the Nature of the Humours, which produces inteſtine, circulatory, ſecretory, nutritive and excretory Motions, without inequality, and without the Effects of this. And indeed the moſt evident Sign that teaches that this equality is there, is the Abſence of Pulſations, Tumors, Pains, and Heat. 5ly, If that is the reaſon of the Union betwixt the Mind and Body, from whence proceed moderate not violent Paſſions. 6ly, If there is a roſy white Colour, or of a good liking black, the Heat be moderate, and a Lightneſs upon the Senſes. 7ly, The great Strength of reſiſting all Cauſes of Diſeaſes.

But the greateſt Power of overcoming the particular Cauſe of this or that Diſeaſe, whether poiſonous or contagious, does not always denote the moſt perfect Health, but the contrary, as is clearly evident in contagious and venemous Diſeaſes.

The Signs of a particular State of Health.

THE beſt ſingular Condition of every *Viſcera* is known by its Action being found ready, apt and regular in the performing its Effects; which ſince in *Phyſiology* they are ſo largely explain'd, they may eaſily be refer'd to that, with the juſteſt Reaſon.

But *Health* is a Condition that lodges in the whole Texture of all the Body together, conſiſting of Solids and Fluids; therefore this is particular to every Man, and conſequently is only ſuch as it is from the Nature of every ſingle Body; hence therefore the various Bodies which differ ſo much, as well in Solids as Fluids, yet may be ſingularly or diſtinctly healthful; from this the Antients call'd it ἰδιοσυγκρασία, an *Idioſyncraſy*, or the Health of the Temperament or Conſtitution, which would be more difficult to determine to ſingular Heads; but yet the Diviſion propos'd by the Antients, into a hot, cold, moiſt, dry, bilious, ſanguine, flegmatick, melancholy Temperament, hath its Uſe in Phyſick.

The Signs of a hot Conſtitution are deſcrib'd to be yellow, groſs Hair abounding throughout the whole Body in great Plenty; a reddiſh Colour of the Eyes in the white Part, very red in the lachrymal Caruncles, the Face, Lips and Mouth; the Body ſlender, agile, robuſt and hot; the Pulſe large and quick, addicted to Paſſion, but of ſhort continuance: In theſe the Veſſels ſeem to be robuſt, the *Viſcera* ſtrong, the Humours very moveable and fibrous; in which moiſt, diluting and well temper'd things are ſerviceable, but if too hot and dry, very injurious to the Body.

The Signs of a cold Conſtitution are juſt the contrary; the Hair is thin, the Complexion pale, the Body groſs, ſlow, weak, cold and eaſily ſubject to ſwell, the Pulſe is leſs and heavy; in theſe the Humours are ſoft, wat'ry and pituitous, the Solids lax and flabby, corroborating warm things are uſeful, but the cold and moiſt relax.

The dry Temperament hath a near relation to the hot, eſpecially if attended with Leanneſs; the Veſſels are here contracted, the Moiſture is very little, and that almoſt acrid; therefore it is very advantagious to the dry Conſtitution.

A bilious Temperament is deſcrib'd by Plenty of black curled Hair, Hardneſs and Leanneſs of the fleſhy Parts, by a brown Complexion with large Veins, a great quick Pulſe, Obſtinacy and Anger; in theſe there appears to be a greater quantity of the Solids than the Fluids; the hot and dry Medicines are hurtful, but the moiſt and cooling profitable.

But a ſanguine Conſtitution is diſtinguiſh'd by fine flaxen or light brown colour'd Hair, ſoft Fleſh and abundance of it, large blew Veins, diſtended with Blood, a roſy Complexion, Anger and a Readineſs to Action, Evacuatories and temperate things are ſerviceable to theſe, but heating ſtimulating things injurious.

Likewiſe the flegmatick is depicted with a greater Smoothneſs of the Skin, white thin Hair that grows but ſlowly, a white, tumid, ſoft, fat Body, narrow Veins that lie obſcure; in theſe the Blood Veſſels ſeem to be ſtrait, but they are more extended in the cold Conſtitutions; hence moiſt and cold things are chiefly pernicious, but whatever heats, ſtrengthens and dries is aſſiſting.

Laſtly, the Indications of a melancholy Temperament are Baldneſs, black Hair, great Leanneſs, much Dryneſs, the Complexion for the moſt part black, they are conſtant in their Inclinations, remember Injuries, and have great Penetration in Knowledge; wherefore in theſe the Veſſels appear cloſe, ſtrong, the Humours are denſe and tenacious, not eaſy to be divided or chang'd; hot, dry and acrid things are moſt hurtful to ſuch, but they are reliev'd with all moiſt'ning, cooling, relaxing, emollient, gentle Diſſolvents.

The Signs of Diſeaſes.

THE Signs of a future Diſeaſe are known or diſcover'd firſt, from the unuſual Change of certain Functions, eſpecially if the Perſpiration of *Sanctorius* be leſſen'd from an unaccuſtom'd Wearineſs, and a ſenſible Weight or Heavineſs in the Body. 2ly, From an accurate Knowledge of the Temperament in every Man, and alſo from the particular Structure of every Body. 3ly, From the Obſervation of *Claſſes*, in which are contain'd the Procatarctick Cauſes. 4ly, From the certain Knowledge of Epidemical Diſeaſes reigning at any time.

The Signs of Diſeaſes that are paſt, are learnt from their known Effects, that are left behind after ſome Injury of any ſolid Part, or the conſequences of the offending Humours, or after ſome Actions that are interrupted ; for he that conſiders the Uſe of the Parts in Health, knows the Defects that remain, from whence he conceives the nature of the Diſeaſe.

The Signs of a Diſeaſe preſent, have regard to the Cauſes, Nature, Symptoms, State and Event thereof.

The Signs indicating the nature of the Cauſe of a Diſeaſe, are diſcover'd, firſt, From the Obſervation of theſe things, which apply'd to the Body, conſtitute Diſeaſes, or by Application make them, as we may ſee in the *Aitiological Pathology*. 2ly, From the *Idioſyncraſy*. 3ly, From the obſerv'd Nature of the Effects meeting in the Senſes.

A Diſeaſe of the ſolid Part is known, firſt, From the ſtrength, quality and manner of Application, from the Duration of the Cauſe whether internal or external. 2ly, From the ſenſible Change of the Qualities, Situation and Connexion of the Place affected. 3ly, From the wounded Functions. 4ly, From the Excretions produced from the Place affected, directly or obliquely.

Wounds, Contuſions, Corroſions, Burns, if apparent to the Senſes, are known thereby. But the Condition and State of theſe is known, firſt, From Sight or looking upon them. 2ly, From the nature of the Part injured ; and 3ly, From the Symptoms.

The Event of them is preſaged ; firſt, From the Neceſſity of the Function hurt, to Life or Health. 2ly, From the nature of the wounded Part. 3ly, From the very manner of the Wound. 4ly, From the Temperament or Conſtitution of the Patient.

Ulcers, Fiſtula's, Scirrhus, Cancers, Inflammations, Gangreens, being apparent to the Senſes, eaſily ſhow that they are known by their *Pathognomick Signs*, which are contain'd in the very Definition of them. But the State of them is known, firſt, From Inſpection, Taſte and Smell. 2ly, From the nature of the Part injured. 3ly, From the Obſervation of the *Symptoms*.

But the Event is preſag'd, firſt, From the nature of the Miſchief. 2ly, From the nature of the Part, and its conſequence upon Life or Health. 3ly, From the Vicinity of other known Parts. 4ly, From the difficulty of giving Relief. 5ly, From Conſtitution.

But theſe Evils lie within, hid from the Senſes, they are yet to be diſcover'd, by enquiring into the Signs. Firſt, From the nature of the Cauſe. 2ly, From ſome Function that is hurt or impeded. 3ly, From the Excretions. 4ly, From the Place affected, known by Anatomy, whether internal or external. 5ly, From the ſenſible quality of the Part that is affected.

The Place affected in Diſeaſes, if external, hath moſt commonly Signs, that lie open to the external Senſes, from whence it is eaſily detected; for there are many of theſe, as *Wounds*, *Contuſions*, *Inflammations*, *Oedema's*, *Ulcers*, *Gangrenes*, *Luxations*, *Diſtortions*, *Fractures*, *Caries*, *Atrophia's*, *Scirrhus*, *Cancers*, &c. likewiſe a comparing of the Function injured with the Origine of that Inſtrument, whereby the Action is made whole, teaches us the Seat of the Diſeaſe.

An internal affected Place, appearing more difficultly from an internal Cauſe, is yet diſcoverable. Firſt, From the known Nature of the Cauſe. 2ly, From the injured Function. 3ly, From the Nature of the Diſeaſe. 4ly, From the Excretions. 5ly, From the Symptoms being well known and compared with the Anatomical Knowledge of the Parts; for from theſe Five Fountains, internal Diſeaſes are more particularly known, ſuch as lurk or lie hid in the *Brane, Noſe, Face, Breaſt, Pleura, Mediaſtinum, Pericardium, Lungs, Heart, Diaphragm, Liver, Spleen, Stomach, Pancreas, Meſentery, Guts, Reins, Ureters, Bladder, Urethra, Womb* and *Parts of Generation*.

The Signs of an acute Diſeaſe proceeding from the Humours, are taken, firſt, From the Celerity and Violence of the Increaſe of the Diſeaſe it ſelf. 2ly, From the Vehemence of the Symptoms. 3ly, From the wounded Functions. 4ly, From the things excreted. 5ly, From an Epidemick Conſtitution. 6ly, From the Seaſon of the Year. 7ly, From the Age, Sex, Life and Temperament of the Patient.

If all theſe Signs are ſtrong, they pronounce great Danger, but if lighter, they promiſe ſome Good.

Again, the Signs of an Acute Diſeaſe in the Fluids, which define and preſage the Condition, Danger, Duration and Event, are underſtood from the obſerv'd Effects depending on our vitiated, or deprav'd Humours.

The Signs of Acrimony in the Humours are, firſt Pain without any Signs of an increaſed Motion; and without any apparent Obſtruction, as the eating or waſting of the Parts without any manifeſt Tumors.

The Signs of an alcaline Acrimony, are a ſtinking Cadaver, ſmelling in the whole or in part, the *Sapor* of Fleſh, or putrefied Urine eating away of Fleſh of an aſh, lead or black Colour, and that increaſing ſwiftly by degrees, a loſt Appetite abhorring all ſorts of Meat, the *Fæces* thin, ſhining, cadaverous, brown or black, the Urine acrid, thick, brown and frothy, fetid like that of Putrefaction, and ſcarce letting fall any Sediment, little or no Sweat, or elſe like the Urine deſcrib'd, the external Skin dry, and the inward Part of the Noſtrils, Mouth, Tongue, Jaws, the Blood thin, broken, florid and ſcarcely adhering together, little red Puſtules, that have matter in them of brown, black or lead Colour, Boils, Bumps, Purple Spots and ſharp Inflammations.

The Signs of an acid Acrimony, are Sourneſs to the Smell and Taſte, a pale Colour of the Face, the Corners of the Eyes, Lips, Mouth, Gums and Jaws, a ſlow waſting with Paleneſs, the Thirſt not great, the Appetite often large, Digeſtion quick, a ſtrong Deſire to earthy and abſorbing things, Gripes of the Belly with Paleneſs and Cold, green, ſour, griping Stools, the Urine coming ſlow, thick and white, with a groſs plentiful Sediment, much Sweat, and that acid, Laxneſs of the Skin, and thick and ſometimes pale colour'd Blood, ſometimes blacker, ſlight Inflammations, *&c.*

The Signs of a muriatic or armoniac Acrimony, are ſalt Taſtes, gentle, ſlow Eroſions that are ſcabby and leave a Redneſs, a conſtant great Thirſt ſcarce to be quench'd, Dryneſs, Rigidity, ſalt Urine, ſlowly putrefying with a thick Sediment, and a thin, fat or oily Pellicle ſwimming on the top.

The Signs of an oleous putrefied Acrimony, are an Empyreumatick Stench, a bitter or rancid Taſte, a ſour fat as from burnt Oil, ulcer'd Jaws, a hot waſting of Fleſh, Loathing of Meat, an Appetite quite loſt and that with Horror, the greateſt Thirſt, fat and ſtinking Excrement that appear very ſcorching in Evacuation, ſcalding, fetid, frothy Urine that is little in quantity, a dry Skin and Mouth, Heavineſs and Oppreſſion, Inflammations that are acrid, ſudden and obſtinate, Suppurations of the like nature, and fetid *Gangreens*, all which are relieved by cooling, acid, watry Remedies.

The Signs of too great a Fluidity, are the Perſpiration of *Sanctorius*, Sweat, Urine and *Saliva* being too much increas'd, a Waſting, Contraction, Weakneſs and Thirſt throughout the whole Body, which is aſſiſted from inſpiſſating Medicines.

The Signs of too great an Increaſe of the Hardneſs of the Body, are Tumors, Pain and Anxiety, the Hindrance of Circulation, Secretion and Excretion, a *Lentor* of the circulating, ſecreting and excreting Humours, if attended with a Coldneſs, ſhows a pituitous, but if with great Heat, then a groſs or hard Inflammation, from whence alſo the Signs of Water, Salt, Oil or Earth predominating are obſerv'd.

But if, together with the foreſaid Signs, all theſe Signs of Life and a vigorous Circulation appear together, then it declares the quickeſt and utmoſt Deſtruction, but the contrary Signs demonſtrate the oppoſite.

From weighing all theſe well together, are underſtood the Signs of Malignity in acute Diſeaſes; for ſince this ſignifies the quickeſt Change of a Diſeaſe into Death, theſe things may be collected, firſt, From the ſtrongeſt ſwifteſt Cauſes apply'd to the Body, as are *Plague*, *Poiſon*, *Fire*, and Putrefaction or Corruption. 2ly, By Obſervations from the known violent Nature of a predominant Epidemick. 3ly, From the known natural and morbid Conſtitution of the Sick. 4ly, From an obſtinate Reſiſtance or Refuſal of all ſorts of Medicines, tho' endowed with full Strength to change the Diſeaſe. 5ly, From ill *Symptoms* which ſhow that the vital Actions are particularly hurt or injured, ſuch as are in the firſt place, unquenchable Thirſt, Dryneſs, Foulneſs, white, yellow, brown and black Colour, eſpecially furr'd in the Mouth, Noſtrils, Tongue, Jaws and Palate, intire Loſs of Appetite, a conſtant *Nauſea* and Vomiting, Hiccup, Pain and great Uneaſineſs about the Stomach, a continued puking of *Serum*, *Gall* and putrid Humours by Vomit, Evacuation of looſe fetid Stools, very much weakening the Fibres, Caruncles and Membranes that are exercis'd in their Diſcharge, a very thin, red, frothy Urine, made in ſmall Quantities ; cold clammy Sweats about the Head and Neck, a quick, weak Pulſe that is hard, uneven and intermitting : Sudden, difficult and obſtructed Reſpiration, with Coughing and Pain ; Loſs of Senſe, Delirium, Raving, no Sleep, but what is labour'd and diſturb'd ; Excretion or Voiding of Blood by Stool or Urine ; ſmall Drops of Blood diſtilling from the Noſe ; unuſual Tremblings of the Tongue, Lips and Hands ; ſtrong Convulſions, conſtant falling down of the Limbs and Head, with a ſort of careleſs hanging down of the Legs and Feet from the Bed ; a wild, wandring, fix'd Look of the Eyes ; a gathering up or folding of the Bed-cloths, labour'd and ſollicitous Palpitations, Purple Spots, *&c.*

Acute Diſeaſes that are to be overcome by Nature or Art, are judg'd ſo, from the Abſence or Want of theſe Signs ; and the contrary, Crudity, Concoction, a Criſis, the Event towards Health, another Diſeaſe or Death are the Objects and Signs of a Prognoſtick in Diſeaſes.

The matter of a Diſeaſe which is endowed with that Subſtance, Figure, Coheſion, Moveableneſs or Inactivity, that makes or increaſes the Diſeaſe, is call'd *crude.*

But that State of the Diſeaſe in which it is ſo, is call'd the Crudity of the Diſeaſe, which obtains equally as well in Diſeaſes, where the whole Maſs is infected, as in thoſe where one Part is over-charged with ſuch a matter ; which is the ſame thing in the Solids.

That *Crudity* is known, firſt, from the Vigour of the Diſeaſe continuing or increaſing. 2ly, From the daily Increaſe of the Symptoms. 3ly, From the Exerciſe of the Functions very much impair'd. 4ly, Beſt of all from the Receſs of all the circulating, ſecreting, excreting and excrementitious Humours, from the ſound State of the Body as to Quantity or Quality: From whence it is indicated or ſhown in *Sweat*, *Tears*, *Mucus*, *Saliva* and *Sputum* thrown up by *Vomit*, in *Bile*, *Fæces*, *Urine*, *Corruption*, *Blood*, *Menſtrua*, *Lochia*, *Milk*, an *Abſceſs* and in *ſore Throats.*

But if the matter of the Diſeaſe being firſt crude, is by the Actions of Life, its peculiar Nature, or proper Remedies ſo chang'd as to Subſtance, Figure, Coheſion, Motion, Inactivity, that it recedes leſs from a ſalubrious State, does leſs harm, and therefore leſſens the Violence and Strength of the Diſeaſe, it is now call'd *Concoction* or *Digeſtion.*

But that State or Condition of the Diſeaſe, in which theſe things are thus perform'd, is call'd *Digeſtion*, *Maturation*, or a πεπάσμος.

That State of the Diſeaſe and its matter is known firſt, from the reſt of the Diſeaſe and its Decreaſe, the Strength of Life, in the mean time remaining or increaſing. 2ly, From a ceaſing or leſſening of the *Symptoms*, with the concomitant Vigour of Life: 3ly, From a Reſtitution of the Functions whole again. 4ly, From a Similitude or the Likeneſs of the circulating, ſecreting, excreting and excrementitious Humours, with the Natural ones.

The Cauſe that changes the crude Humours into Digeſtion, is the remaining Action of Life, the aſſiſting Virtue of the Medicines.

The matter of the Diſeaſe thus far digeſted by its Cauſes, that the likeſt may eſcape to the healthful, is call'd a freeing or removing the Diſeaſe: That Action is a reſolving or looſning, which makes perfect Health, that happens without any Evacuation; ſuppoſing the matter benign, the beſt Nature and good Medicines.

In acute Diſeaſes, which have their Reſidence in the Humours, the matter of the Diſeaſe is ſo diſpos'd, that the greateſt Part in a certain or prefix'd time, makes a ſudden change of the Diſeaſe, to Health or Death, which thorough change is call'd a *Criſis*, and the very matter thus diſpos'd is call'd *critical.*

The Cauſe of ſuch a Motion, is the remaining Strength of Liſe, irritated from the matter of the Diſeaſe, endowed with various Conditions, that it may be evacuated, tranſmigrated or be deſtroy'd.

If the matter is fit for Evacuation or Change of Place, yet not like to that of Health, it produces a different Alteration in the Motion of the Humours from that Condition, which us'd to be in healthful Bodies, it is call'd a critical Perturbation or Diſturbance.

But thoſe thorough Changes which ariſe from the Strength of Liſe, beginning to move, lead round, mix and ſeparate the critical matter, if they are ſenſible ones, they are call'd critical Symptoms, and are the Signs of a *Criſis* now coming on, or to be hereafter. The Diſtinction whereof is difficult, and the Ignorance of it full of Hazard.

For they are often confounded with Symptoms from the Cauſe of a Diſeaſe, from a Diſeaſe it ſelf, or the crude matter of the Diſeaſe, from whence oftentimes follows an unhappy Method of Cure.

But the Signs by which the critical Symptoms are diſtinguiſh'd from the morbid ones, are firſt of all theſe. 1ſt, Thoſe Symptoms are rais'd from the Strength of Life, exceeding the Strength of the Diſeaſe, but theſe from the Strength of the Diſeaſe, prevailing over the Vital Faculty. 2ly, Thoſe make their Progreſs from the Concoction manifeſted by their Signs, and the Advantage found there, theſe in the known Crudity. 3ly, Thoſe make a *Criſis* about a proper time, theſe in every time of the Diſeaſes, eſpecially in the Increaſe. 4ly, Thoſe are relieved in a ſhort time, theſe hurt quickly.

Thoſe Primary Critical Symptoms and Signs, are theſe which precede an evacuating *Criſis*; after Digeſtion in a critical time ſuddenly, without any new apparent Cauſe of a Diſeaſe; a *Stupor*, *Sleepineſs*, *Dullneſs*, *Watching*, *Delirium*, *Anxiety*, a *Dyſpnoæ*, Pain, Redneſs, Titillation, Heavineſs in the Parts, ſpontaneous Tears in the Eyes, Loathing, Heat, Thirſt, Retraction of the *Hypochondria*, trembling Agitation of the lower Lip.

The Signs of a critical Evacuation are known, if from thence there proceed Vomiting, Salivation, Excretion of *Mucus*, a Flux by Stool, Urine, a Hemorrhage from the Noſe, Womb, or Hemorrhoidal Veſſels; Sweat, an Abſceſs, Tumours, Bubo's, Swellings of the Parolids, ſore Throat and a Tranſlation of Humours from Place to Place.

Theſe Things are known to be ſalubrious *Criſes's*, if they are not diſturb'd by Art, but are promoted; if Digeſtion precedes, the State of the Diſeaſe and the Strength of a regular Life, than the Excrements are ſimilar to the Natural one, and agreeable to the Diſeaſe and the Part affected, to Diet, Age, Sex and Temperament, the time and place, being aſſiſting after theſe, as well to the Diſtemper, as the Symptoms; Colour, Heat, Strength, a Pulſe, Reſpiration, and all the Actions are preſently reſtor'd, begin to recover, and alſo a Conſtancy of critical Evacuation even to the end of the Diſeaſe, for if there are all theſe or more Signs, then there will be a perfect Separation from a morbid State to a healthful one, and this is call'd a compleat evacuating or ſeparating *Criſis*.

But if thoſe Signs are wanting, or the contrary of them happen, then it will appear that theſe are the Symptoms of the Diſeaſe, and then they are troubleſome, and muſt be cured as the Diſeaſe it ſelf, but if all theſe are not preſent, but only ſome and thoſe not perfect, then it declares the critical matter that is brought hither to be amiſs, and will produce various *Phænomena*, which *Criſis* is call'd *μεταστατικὴ*.

From hence, the Anxioms in Diagnoſticks and Prognoſticks and others of the like Nature are received; a critical Evacuation after Concoction is always good.

In the ſame critical Day it is advantageous.

But it is various according to time and matter, as to the Difference of Age, Conſtitution, Sex, Climate, Seaſon of the Year, Diſeaſe, and Epidemical Temperament.

That will be before Concoction miſchievous.

But that Concoction always good.

The quicker the Concoction, the better it is; but not a *Criſis*.

The Fore-knowlege, diſcovering the Event or Conſequence of a Diſeaſe, is founded more particularly in the known Cauſes compar'd amongſt themſelves, on which depends the Life of the Sick, that is as yet preſent and remaining, and from whence alſo the preſent Diſeaſe ariſes in that; for from theſe things plainly ſeen, is found out the *Preſage* of the Termination of a Diſeaſe in Life, Health, to another Diſtemper or Death; for from theſe are underſtood the Times and Permutation that happen.

The Efficacy of the Cauſe from which Life as yet remains, is known from ſome certain Function that remains; firſt, Vital, then Animal and likewiſe Natural; which indeed may be pronounc'd from both theſe Axioms, by which means, the more the Functions are like to thoſe which us'd to be in Health, thence there is a greater Vigour or Life, and that better, and from thence there is more Hopes of a perfect Recovery to Health; for by how much ſoever that Function is more ſalubrious in Sickneſs, from which ſeveral others depend as on their Cauſe, it is ſo much the more ſerviceable to the Patient, and ſo on the contrary.

But a Function is known to be like that which is in Health, if the Effects being inſeparable and ſenſible, are found to be ſuch as are there requiſite; but firſt, we muſt learn from hence the Goodneſs of it, if the Cauſe, Matter and Effect of the Diſeaſe, are converted by thoſe remaining Functions into Health, and that eſpecially from a good *Digeſtion* of the morbid Matter and a good Excretion.

The beſt *Digeſtion* is thought to be that, whereby the Crudity is ſooneſt and moſt compleatly made like that of the Natural Humour: From whence this *Axiom*; the better the *Concoction* is made, there is more Hopes for Life and Health.

And it is known, that the Humours return into a ſound Condition, and alſo the ſolid Parts are reſtor'd, if certain Actions that are interrupted, during the time of the Crudity are reſtor'd and made whole again: And if all the Excretions enjoy the Likeneſs of the ſound Parts; from whence theſe *Axioms* ariſe, that the more the Actions become ſalutary, the better the Concoction is; and again, the liker all the Excrements are to the Natural ones, the more perfect is the Concoction; and ſo on the contrary.

Laſtly, The Strength and Force of the Vital Cauſe is alſo known from the Age, Sex, Conſtitution, Life, Country and Family of the Patient. And from all theſe, the Phyſician may gather the Strength of the Sick, and the Nature of the Cauſe.

But the Strength and Magnitude of the Cauſe producing the Diſeaſe is known, firſt, from its greateſt, malignant and moſt obſtinate Cauſes. 2ly, From the obſerv'd Diſpoſition of the Diſeaſe, by the known epidemical Conſtitution. 3ly, From the Plenty, Size and Sharpneſs of the Symptoms. 4ly, From the Crudity or ill Digeſtion. 5ly, From the great Change of the ſenſible Qualities, as to Figure, Subſtance, Colour and Conſiſtence. 6ly, From the Excretions very much receding from Health.

From theſe Cauſes exactly known and accurately compar'd among themſelves, a Prediction is made by theſe *Axioms.*

If the Cauſe of Life be more efficacious in the Sick, than the Cauſe of the Diſeaſe, then the Patient will be cured in a ſhort time.

If the Cauſes of Life and the Diſeaſe be equal in Efficacy, then there is Danger, Continuation, or another Diſeaſe foretold.

If the Cauſe of the Diſeaſe be more powerful than the Cauſe of Life, the Death of the whole, or a Part follows it.

The Greatneſs of the Danger in Diſeaſes is likewiſe regarded by the Exceſs thereof, whereby the Cauſe of the Diſeaſe overcomes the Cauſe of Life.

The Duration of that is meaſur'd by its Slowneſs, from which the Diſeaſe tends to its utmoſt Height, from the Weakneſs of Life, from the Stubbornneſs and Toughneſs of the matter.

Another future Diſeaſe is known from thence, when the Strength of the Diſeaſe and its Symptoms remit without *Digeſtion*, and without good, ſufficient, critical Evacuation, and that in a Diſeaſe from matter.

But that ſucceeding Diſeaſe is often worſe than the former, and more laſting, according to the Diverſity of the injured Part, which that new Diſeaſe takes Poſſeſſion of, or from the Variableneſs of the new chang'd morbid matter, or only from the Delay of time.

But the Place may be known, which the ill digeſted matter of the Diſeaſe will poſſeſs, from the Itching, Titillation, Redneſs, Pain, Heat, Swelling, Numbneſs, Pulſation, Agitation, and continual Uneaſineſs of the Patient, as well from the

Nature and Idea, as the univerſal State of the Diſeaſe.

Therefore if it is obſerv'd, that Art or Accident produces thoſe things in ſome Part of the Body, as hath been ſaid, then alſo we may foreſee that the matter of the Diſeaſe will be collected into that art.

From all theſe Things it is evident to us, that the Knowledge of *Digeſtion* and the *Criſis* is particularly to be underſtood; that good Prognoſticks may be made on Diſeaſes; and it is plain, theſe can only be acquired from the known vital Function, as from its ſpecial Cauſe, and this is chiefly gain'd from the Pulſe and Reſpiration: Therefore it will be proper to enquire into theſe firſt, and then of *Urine*, as it is a Recrement from the whole Maſs of Blood, and all its Parts, caſt out by Vigour and Force of Life, but theſe require an accurate Conſideration.

Of the Pulſe, of the Artery, as a Sign.

THE *Pulſe* of the Arteries which declares the definite Condition of the Heart as the firſt Mover, as alſo the Nature, Plenty and Motion of the univerſal Fluid, from whence proceed all the reſt; together with the different State of the Artery, the primary Veſſels of all the Parts of the Body, is manifeſt in the Art of knowing the *Signs* to confirm the Doctrine of *Pulſes.*

Therefore a ſtrong *Pulſe* denotes, firſt, the muſcular Force of the contracted Heart, and ſo the Efficacy of the contracting Cauſe, that is, 2ly, the ſufficiently ſtrong and plentiful Influx of the nervous Humour, and that of the *Cerebellum* into the *Villa* of the Heart. 3ly, Abundance of Blood. 4ly, Circulation and Secretion of the Humours. Therefore

fore ſuch a *Pulſe* is a good Prognoſtick, if it is found to be ſuch in the whole Body, and in all the Parts thereof; it frequently deceives in Apoplectick Caſes and ſome others, where the reſt are very much obſtructed, in their free courſe from the Heart into the *Cerebellum*, and from that into the Heart, and firſt of all in the *Viſcera*.

A weak *Pulſe* ſhows all things contrary to the former, but ſometimes deceives us in thoſe Perſons, who are very fat.

A large *Pulſe* declares 1ſt, Plenty of Blood. 2ly, Strength of the Heart. 3ly, A free and contractile Artery. 4ly, A good Circulation and Secretion; a ſlow *Pulſe* ſignifies the contrary; hence a full and empty one may be underſtood, as they are truly obſerv'd.

But a noted hard *Pulſe* hath various Significations, as firſt, that the Membrane of the Artery is dryer than naturally it ſhould be, and therefore, 2ly, there are Obſtructions in the minute Veſſels, that conſtitute the Membranes of the Arteries. 3ly, The Arteries are full, but 4ly, obſtructed at the Ends of the Capillaries, with an inflammatory Hardneſs. 5ly, The Blood is very denſe and compact, hence 6ly, The Circulations, Secretions and Excretions are interrupted. 7ly, All thoſe numerous little Veſſels which follow from theſe, but a ſoft *Pulſe* ſhows quite the contrary, yet deceives us eſpecially in an acute *Peripneumonia*.

A *Pulſe* that is rare or ſeldom in a certain ſtated time, declares 1ſt, that the Contractions of the Heart are ſlower, and from thence, 2ly, there is a ſlower Influx of the *Cerebellous* Fluid thro' the Nerves into the *Villa* of the Heart. 3ly, An equal and aſſiſted Circuit of the Blood. 4ly, An eaſie Circulation of the Humours thro' all the Veſſels. But if ſuch a *Pulſe* proceed from Weakneſs, it is of ill conſequence and dangerous, but a more frequent *Pulſe* denotes the contrary, as irritating Acrids, the Agitation of the Spirits, *Fevers* and *Frenſies.*

A *Pulſe* of equal Strength and Frequency is good, and declares the Conſtancy of Life; the unequal one therefore bad.

The intermitting *Pulſe* is pernicious, and denotes the fading Strength and Vigour of Life.

A ſtrong, large, even and ſlow *Pulſe* together, is the beſt of all, ſtrong and large, ſtrong and ſlow; large and ſlow together are good, weak, ſmall, hard, unequal, intermitting and free together, is the worſt of all; and always ſtill worſe, as more of ſuch like Symptoms meet together.

From the Doctrine of the *Pulſes*, we may underſtand of what Importance Heat is, becauſe it is an Effect of the *Pulſe*; for it denotes, that the Veſſel is bound or conſtring'd, the Humour is denſe, the Propulſion of the Humours ſtrong, the Reſiſtances are great about the Ends of the Veſſels; from whence the Heat being leſſen'd ſhows the contrary; and Heat and Cold are known as to the Diagnoſtick and Prognoſtick.

Yet it ought to be remembred, that the Nature of a ſingle Artery, Age, Sex, the Affections of the Mind, the Six Non-naturals, the Habit of the Body, proper Temperament, Climate and Seaſon of the Year, can wonderfully alter all theſe. But the *Pulſe* is accurately to be obſerved, as it is the Index of the morbid Matter, of Motion, Secretion and Excretion.

Of Reſpiration, as a Sign.

AN eaſy Indolent but conſtant Reſpiration or Breathing in Diſeaſes, always denotes, that all the Organs contributing thereto are well; that the *Lungs* can eaſily expand, the Blood readily circulate,

culate, and is therefore fitter to flow thro' all the Veſſels of the Body; this is crrtainly a good Sign; on the contrary, difficulty of breathing is conſtantly a bad one.

But that Reſpiration which is alſo very painful, for the moſt part declares ſome internal Inflamation, and is always an ill Sign.

A large Breathing conſtantly ſhows, that the Breaſt is very much dilated of it ſelf, the *Diaphragm* moveable, the *Abdomen* extended, the Blood is eaſily paſs'd thro' the Lungs, and the Strength is good; all which betoken well in Diſeaſes.

A ſmall Reſpiration ſignifies the contrary to the former, but eſpecially it ſhows that the Lungs are very rigid, either with the Blood that will not paſs or ſome other matter; or elſe that the Pulmonary Pipe is ſtopt with ſome Tumour or other Thing, ſo that the Air can ſcarcely be receiv'd in; this is a very Bad Sign.

A ſlow Reſpiration demonſtrates, that the Lungs are equally free and expanſible, the Blood enters the Parts, and the *Pulſe* is equal: This is a very good Sign, if there is neither *Pain* nor *Delirium*.

A quick Reſpiration denotes, that the Organs of Breathing are hurt; the Lungs are obſtructed, rigid, dry; the Blood not in a Condition to flow thro', and therefore we ought to be under fearful Apprehenſions.

An equal Reſpiration predicts, that the Lungs are good, the Organs right, the Blood well digeſted, which are good Signs, but uneven, or irregular Breathing, denotes Life is in Danger, and there is an ill Sign.

To take Breath as if a Man was choaking, which creates in the Sick a Senſe of Strangling or Suffocation, ſhows that the Lungs are inflam'd, obſtructed, full, rigid and dry; that the Blood does not circulate, whence in a ſhort time it becomes mortal, unleſs it be ſuch a one as ariſes either from a light ſpaſmodick Cauſe, in Hyſterick and Hypochondriack Caſes, or from a common one in *Aſthma's*.

A Reſpiration acting on the Top of the Breaſt, ſhews the worſe Condition of the impleted Lungs, and therefore Danger of Life.

That is moſt ſublime, which is perform'd by the Elevation of the *Clavicles*, the Agitation of the Breaſt, the Motion of the *Scapula*, the ſhort drawing in of the Sides of the Noſtrils, the Inferior Ribs and *Abdomen*, which being work'd ſtrongly together is mortal; for it ſhows a very difficult Motion of the Blood through the Lungs, and alſo Want of Strength.

An eaſy, large, ſlow, equal, reviving Reſpiration, perform'd only by the gentle Motion of the *Intercoſtal Muſcles*, thoſe of the *Diaphragm* and *Abdomen*, is extraordinary healthful; but that which ſupplies the moſt of theſe Symptoms, we eſteem the beſt.

A difficult, painful, ſmall, quick, panting, unequal, ſuffocating high Breathing, exerciſed with all the Strength of the Muſcles growing to the Ribs, is undoubtedly Mortal; but that which hath the moſt of theſe ill Symptoms is ſo much the worſe, becauſe it carries the more of them with it.

A cold Breathing is mortal, conſidering it is always the Fore-runner of a Gangrene of the *Viſcera*, and other internal Veſſels.

A ſmall Reſpiration with a whiſtling Noiſe and Heat, as it were in the Lungs and Throat, is quickly Mortal, if there remain any more Signs, that are dangerous; it ſignifies that the Vital Fluid paſſeth not thro', but is collected there and thrown upon the Lungs.

A large and quick Reſpiration is often a Sign o Health, and the Cauſe of a good *Digeſtion* and *Criſi*

But one that is large and rare declares the Brai to be obſtructed, and the Diſeaſes made from thenc

preſen

preſent or future; to be a *Coma* or Drowſineſs, *Lethargy* and *Delirium.*

In the interim we ought rightly to conſider, that Reſpiration is very diſorder'd and different, in different Perſons, according to the Nature of the Conſtitution, the different Formation of the *Breaſt*, *Lungs*, *Diaphragm*, and *Abdomen*; the Diverſity of Age, Sex, Bulk, Affections of the Mind, Habit of the Body, Climate, Seaſon of the Year, Weather, and the like.

The various Order indeed, by which the received Changes or Alterations of Breathing mutually vary themſelves, affords a great deal of Light to the Diagnoſtick and Prognoſtick Rules; for the Change from bad to good is beſt, but from good to bad the worſt; but at the time the *Criſis* riſes, the beſt.

Therefore becauſe one Reſpiration declares to us the preſent State or Condition of the *Heart*, *Lungs*, *Blood*, *Liquor* of the *Cerebellum*, the *Pleura*, *Breaſt*, *Diaphragm* and *Abdomen*; it is plain, that an accurate Obſervation thereof is of the greateſt moment, eſpecially in an acute Diſeaſe, to prove the Prognoſtick and confirm the Diagnoſtick Part.

Of the Urine, as a Sign.

FRom Sight of the Urine, a Judgment may be made of the Condition of the Body. 1ſt, The Urine of a ſound Man in it ſelf, and comparing it with others, is different according to the Difference of Age, Sex, Temperament, Seaſon of the Year, the Six Non-naturals and Medicines. 2ly, Therefore in paſſing Judgment of Urine, we are to have nice Regard to other Signs, appearing in Diſeaſes; or otherwiſe this Art is very full of Fallacy or Deceit.

In examining the *Urine*, that it may be ſerviceable to the Phyſician, to make his Diagnoſticks or Prognoſticks by, the Quantity, Colour, Smell, Taſte, Fluidity, and Contents Inherent therein is conſider'd.

The Quantity of Urine increas'd more than uſual ſhows, ſomething of theſe following either ſingly or all together: 1ſt, Abundance of watry Drink. 2ly, The particular Laxneſs of the Renal Pipes. 3ly, The leſſening of Perſpiration, Sweat, *Saliva.* 4ly, The taking of Diureticks. 5ly, An imperfect Mixture of Blood, by which the aqueous Part eaſily departs from the reſt. 6ly, Nervous Affections, an Hyſterick Temperament, or an Hypochondriack Diſeaſe.

Such Urine as this ſhows the Remainder to be thick. 2ly, The Acrimony of it. 3ly, Thirſt. 4ly, Anxieties. 5ly, Obſtructions and their Effects. 6ly, A Conſumption from a *Diabetes*, which occaſions Dryneſs and burning Heat.

A leſs Quantity of Urine than uſual, ſignifies 1ſt, a Sparingneſs of Drink, or too great Plenty of Spirits, produced from Fermentation. 2ly, The Veſſels obſtructed or contracted with a *Spaſm.* 3ly, An Increaſe of ſome other Excretions; but if it is intirely intercepted, it denotes an *Iſchury*, and the various Cauſes thereof.

Such a Secretion of Urine preſages, future Repletions, Heavineſs, Stupidity, a convulſive Trembling and Apoplexy, eſpecially if it ariſes from Obſtructions.

A thin and as it were watry, limpid, colourleſs *Urine*, that is inſipid, without Smell, and flows plentifully, ſhows 1ſt, that there is abundance of Water or aqueous Liquor drunk. 2ly, That the Renal Veſſels are conſtring'd, while yet the Humours are ſtrongly agitated. 3ly, That there is a cloſe Coheſion of Oil, Salt and Earth in the Urine it ſelf, likewiſe a Tenaciouſneſs of theſe, and difficult Mixture of the watry Part with them. 4ly, Enormous Affections of the Mind, Hypochondriack Inſults, Green Sickneſs. 5ly, The *Viſcera* unapt for Digeſtion, Crudities, Flegm and Cold. 6ly, Obſtructions of the *Viſcera* and Veſſels. 7ly, But in acute Diſeaſes, it marks out the Impediments of Concoction and a *Criſis*, and the driving of the morbid matter into the inward Parts of the Body.

But in acute and inflammatory Diſeaſes, ſuch Urine foretells the worſt Condition of the *Viſcera*, *Deliriums*, Frenſies, Convulſions and Death, proceeding from a Gangrene, by reaſon of the retain'd Acrimony.

A red Urine without Sediment in acute Diſeaſes, teaches 1ſt, a ſtrong Motion of Attrition betwixt the Parts, conſtituting the Humour, the Veſſels and Humours themſelves. 2ly, An intimate and tenacious Mixture of Oil, Salt, Earth and Water in the Humours. 3ly, Hence therefore a great Crudity or Indigeſtion of the Diſeaſe. 4ly, A long future Duration of it. 5ly, Great Danger therefrom.

But this Urine preſages, 1ſt, gangrenous Deſtructions of the minuteſt Veſſels, eſpecially in the Brain and *Cerebellum*, and from thence Death. 2ly, A difficult Digeſtion. 3ly, A ſlow *Criſis*, and that very ambiguous; but all theſe appear the worſe, the redder the Urine is, and alſo the more without Sediment.

Hence a thin Flame colour'd Urine without any Sediment, ſhows the ſame thing, but more violent, from whence comes the ſame Prognoſtick, but much more dangerous.

A red Urine together with a copious Sediment, that is heavy, looks red on the ſides of the Veſſel, and is like Bole, ſhows that the foregoing Motion of Nutrition was vehement. 2ly, The Veſſels lax

3ly, The Blood, Acrid, Saline, and unfit for Nouriſhment. 4ly, Intermitting Fevers, that have had ſtrong Paroxyſms. 5ly, Scurvy, in theſe Northern Parts.

It preſages 1ſt, the Length of the Diſeaſe. 2ly, The Attrition, Weakneſs and Deſtruction of the Veſſels. 3ly, Sweats, Urine, Saliva, *Diarrhæa*'s, Colliquative Sweats. 4ly, An *Atrophy*. 5ly, Some Sort of Dropſies.

If in ſuch *Urine*, the Sediment is branny or rough, it denotes the ſame indeed but much worſe.

But if the *Urine* is of a Saffron Colour, that will ſtrike a Tincture or Colour in the Glaſs, and have ſuch a Sediment as the laſt mentioned; it betokens the yellow Jaundice, and the Symptoms are certain and evident in the Skin, the Stools, *Hypochondria*, and throughout the Body, from whence clear Prognoſticks are derived, from the Hiſtory of that Diſeaſe.

A green colour'd Urine together with a groſs Sediment, ſignifies 1ſt, that the Temperament is atrabilious. 2ly, That the ſoluted matter thereof is excerned. And therefore, there are Oppreſſions about the Heart, Coſtiveneſs of the Excrement, Iliack and Cholick Pains.

Such Urine foretells, that the atrabilious matter being diſſolved and moved, paſſes into the Blood and *Viſcera*; from whence are infinite and acute Diſeaſes, which may be traced from the Hiſtory of this Diſpoſition, of the melancholy or black Bile; and alſo from theſe Things we know, what we are to think of black Urine, that is of much worſe Tendency.

Blood, Pus, Caruncles, Filaments, Shreads Hairs, grumous Slime, Gravel, Parts of Stones, a *Mucus* in the bottom of the Urine, ſet forth the Vices of the *Kidneys*, *Ureters*, *Bladder*, *Teſtes*, *Seminal Veſicles*, *Proſtata*, *Cowper*'s *Glands* and *Urethra*.

But what the Nature of the Evil is, that is ſhown by the ſaid Symptoms, and what Place or Part is affected, the concurring Signs ought to teach us, that are obſerv'd in that Diſeaſe, where the ſaid Things are produced.

Fat appearing in the *Urine*, often brings with it ſmall Sands or Gravel invelop'd in the viſcid part, and create a kind of oily Membrane, which denotes a great deal of Earth and ſluggiſh Salt in the Blood, which foretells the *Scurvy*, Stones and the like.

But *Urine* that is very fat and oily, certainly very rare if ever obſerv'd, ſhows, firſt, That the Veſſels are ground in pieces by too great Motion, hence diſſolved, mixed with the Blood and excreted with the Urine. 2ly, Acrid Humours, and therefore it will threaten a *Phthiſick* and an *Atrophy*.

Urine, that being ſhak'd holds the Froth long upon it, denotes that the Oils and Salts are mix'd and diſſolv'd into a ſoapy *Lixivium*, and therefore ſhows, firſt, The Tenaciouſneſs of the Mixture. 2ly, The Difficulty of the Digeſtion and *Criſis*. 3ly, The Diſeaſes are almoſt pulmonick and catarrhous in the Head.

An *Urine* that is naturally fetid, ſhows, the Salts and Oils are attenuated, diſſolv'd and almoſt putrefied, hence ariſes the greateſt Diſtinction, as well in chronick as acute Caſes, and the Cure not eaſy to be effected.

Urine that appears colour'd, but yet hath no Taſte or Savour, confirms the broken Strength of Nature and the Approach of Death.

A pale thin *Urine*, with a mucous ſlimy Sediment and putrid Saltneſs, is almoſt always a Mark of the Stone in the Bladder.

In *Fevers* that are acute, the *Urine* is firſt to be conſulted, as being a ſufficient ſure Prognoſtick: For firſt, The *Urine* that hath a white, light, ſmooth even Sediment, that is muddy, quick, ſubſides and ſcarcely ſmells at all in the whole Courſe of the Diſeaſe to the very *Criſis*, is the beſt Indication and Forerunner. 2ly, Much white ſtrangurious Urine, with a plentiful Sediment that is white and diſcharg'd at a critical time, heals and takes away the Abſceſs. 3ly, A large quantity of Urine in the critical Day, with a white or reddiſh Sediment that is plentiful and light, denotes in the critical Day a Cure from a perfect *Criſis*. 4ly, A thin and reddiſh Urine that ſubſides not, a white, thin and watry one, a yellow thin Urine that is not muddy, or a muddy one that remains ſo and breaks not, ſhow that the Digeſtion is very much impeded in acute Diſeaſes, there is a great Crudity, a difficult *Criſis*, the Diſeaſe will be long and there is the utmoſt Danger of Life; but in acute inflammatory Caſes, it portends almoſt certain Death; laſtly, in moderate acute ones, it betokens a long and tedious Diſeaſe; from whence perhaps a various Abſceſs or a *Metaſtaſis* of the Diſeaſe.

Therefore the Urine declares to us firſt, the Nature, Force and Symptoms of the Blood. 2ly, The State of the Diſeaſe and of Digeſtion. 3ly, The Condition of Secretion and a *Criſis*. 4ly, The Diſeaſes of the *Kidneys*, *Ureters*, *Bladder*, *Teſtes*, *Vaſa deferentia*, *ſeminal Veſicles*, *Proſtata*, &c. 5ly, Some Complaints ariſing in the Bile, the reſt that are taken from Urine alone, are all uncertain and very ridiculous.

ὙΓΙΕΙ΄ΝΗ,

Or the Hygieneal Part of Phyſick.

THere are Three Offices or Duties of the Art of maintaining Health in its ſound State or Condition; to wit, to preſerve Health that is preſent,

ſent, to prevent Diſeaſes that lurk in the Temperament of the Body as a Seed, and that is eaſily rais'd from thence ; and laſtly to diſpoſe Life ſo as to laſt or endure to Old Age.

For Health, ſince it is an Aptitude or Fitneſs of the Body to exerciſe certain Actions, and ſince this conſiſts in a determinate Motion of the Parts, as well Solids as Fluids, it is neceſſary, that this very thing I call *Health*, if it is once made perfect, ſhou'd from its own Nature wear away the ſolid Parts, conſume the Fluids, break both and conſequently deſtroy its very ſelf.

Hence *Health* is preſerved by conſtantly reſtoring the ſame quantity and quality of all the Parts in the Body, ſuch as they were before the deſcribed Deſtruction in the ſolid and fluid Parts.

To this Reſtitution, Meat and Drink and perhaps Air affords ſome Matter, hence they prepare and adapt the Aliment in the Body by vital, natural and animal Actions ; they apply what is prepared, to requiſite and proper Places ; and laſtly, by theſe it is freed from ſuperfluous undigeſted and hurtful things.

Wherefore it is plain, that this whole Art of maintaining Health, being placed in the Deſcription of Laws or Rules, which deſcribe their definite Uſe ; yet it is difficult to promulgate theſe Laws, that the Obſervation of them may equally profit every Man.

The Cauſe of which Difficulty as it chiefly lodges in the *Idioſyncraſy*, therefore it often performs contrary Effects in Men, who yet follow the ſame way or method of Living ; ſo that perfect Health may be kept by every one, altho' they uſe not only different but quite oppoſite ways of Living, than what is preſcrib'd in the Uſe of the Six Non-naturals ; when on the contrary, ſhou'd they change their way of Living, tho' for the better, they wou'd run into a ſickly or unhealthful State.

Alſo *Cuſtom* it ſelf, which they do not call amiſs a ſecond Nature or *Idioſyncraſy*, produces what is ſcarcely to be believed, if we conſider the Effects of the Air, Meat, Drink, Motion, Medicine, Poiſon, *&c.*

Wherefore a ſudden Change from things accuſtom'd,into Novelties, is always and in all places very dangerous, tho' we ſhou'd alter from ill Cuſtoms to ſuch as were reckon'd good ones.

But gradual changing, and frequently to vary the daily Courſe of Life, is of vaſt Service to the Maintenance and Support of Health.

The Air that is always heavy, but yet ſerene and dry, is eſteem'd ſalubrious in every Place: The Effects of it are various, being favourable or hurtful in its Nature, when we inquire into the ſecret Cauſes of Health.

The Qualities of the Air, from their Exceſs producing Diſeaſes, may be remedied by oppoſite Inductions; for the cold and moiſt may be chang'd into hot and dry by the Help of Fire, by dry aromatick Woods, by the Fumes or Smoke of fragrant Fuel, by the admiſſion of warm Air, procured by Art, but if the Air is offenſive by Heat and Dryneſs, it is rectified by the Exhalation of refrigerating things, after an artificial manner, or from the drawing up of watry Vapours from cold Plants, as the *Sallow*, *Popular*, *Roſe*, *Elder*, *Mulberry*, &c.

Therefore a ſerene heavy Air, temperately hot and dry, breath'd in from Inland Parts and freſh Rivers, agitated by a gentle Wind, not liable to ſudden and great Changes, but open and expos'd to the Sun Beams, being free from ſaline and oily Exhalations, is the beſt in general for Preſervation of Health.

But that Diet is eſteem'd the beſt, which is the moſt ſimple and leaſt feculent, void of all Acrimony, and ſcarce endowed with any great Motion of Parts, moſt like to the healthful Temperament of the Body, or at leaſt moſt eaſily aſſimilated to it by the Aſſiſtance of *Digeſtion*, and is prepared to be capable of performing the foreſaid Offices by the culinary Art; this is call'd *Kitchen Phyſick.*

Such as every thing that is choſe, firſt, From Grain, as Corn and Flower that is clean and moderately dry, yet freſh or new, as Wheat, Rye, Barley, Oats, Rice, *&c.* which by Grinding, Sifting, Fermentation and Boiling or Baking, is ſo prepared, that from its grateful Taſte and Smell it is recommended under the Name of Bread, *&c.* 2ly, From Leguminous Fruits, as well Seeds as the like, as Pea's, Beans, Lentils, Vetch's, *&c.* which are prepared as the former, or elſe by bruiſing, pounding and boiling. 3ly, From freſh green olerant Herbs, by gathering their tender young Leaves, *&c.* as Lettice, Spinage, Succory, Purſlane, Sallery, Parſley, Sprouts, Beets, which are prepared by ſtewing them in their own Juice by gentle boiling. 4ly, From Fruits whether more ſolid as Nuts, Almonds, the Bulbs of Turnips, Potatoes, Artichokes, or from Roots of Carrots, Parſnips, Radiſh, Beet and the like, or from the ſofter kind, as Apples, Pears, Berries, Plums, Cherries. 5ly, From the Juice and Subſtance or Fleſh of a young ſound Animal, whether it be Quadruped, Bird or Fiſh, either Inſects or Teſtaceous, if they be prepared by Broiling, Frying, Roaſting, Boiling or Baking, to which alſo we refer Eggs and Milk.

Hard, dry, groſs, ponderous feculent Food, are proper for ſuch who want the *Viſcera* to be ſtrengthen'd, the Digeſtion quicken'd, the muſcular Motion greater, and the Humours more agile in Health; but the ſoft, moiſt, thin, light and pure Aliment is oppoſite to thoſe, and always fit to ſupply the Table.

But thoſe Perſons whoſe *Viſcera* are weak, Digeſtion difficult, and who enjoy a quiet, ſedentary idle Life, ought to have ſuch Food as is made by Art or Nature moſt like to the diluted *Chyle.*

In an alcaliſate Temperament, ſuch things as are ſharp and ſour agree, in an acid or ſour one Alcalies are profitable.

From which few things, the whole reaſon of our Choice of the Quantity and Preparation of Aliment depends; if we firſt know rhe Uſe of the *Viſcera*, the Humours, Conſtitution, Age, Sex and Manner of living.

The beſt Quantity of Meat or Diet to every one is, that he only purſue the Refreſhment of his Appetite, not the Dulling or Clogging of it: Sobriety is ſafeſt to the weak, Exceſs better to the ſtrong.

Sauces or Pickles from Acids, ſalt and aromatick Spices, do Injury to the healthful by their noxious Acrimony, which wound the finer Veſſels, and by a falſe Appetite rais'd by ſtimulating the Parts, they load the Body rather than nouriſh it.

The Goodneſs or Uſefulneſs of Drink is to be underſtood from the ſame Rules, for if it is required to quench Thirſt or remove a Dryneſs and a Thickneſs of the Humours, and to qualify the Acrimony thereof; then cold, clear, light, running Water from pure Springs or Rivers, is the beſt.

But if Drink is required, to the Intention that it may warm and ſtimulate to Motion, and attenuate the Humours, then well brewed Malt Liquors that are kept till they are fine, are proper, as alſo ſprightly neat Wines that are fragrant and grateful; but the Choice, Quantity and Uſe of them muſt be determined by the State and Condition of the Perſon that drinks them.

Meats that are the leaſt fat, and the drinking of Water renders the Body firmeſt and ſtrongeſt.

The Motion of the Body from the Beginning to the End of a gentle Sweat, or even to the Perception of the approaching Warineſs after Digeſtion is begun, with a Senſe of Lightneſs, is beſt; from whence the regular Method of Reſt is taken.

The time of Sleep, when the Body ſleeps ſound, is beſt meaſured by the Agility and Briskneſs of the Body when awake.

All Medicines, either evacuatory or acrid, by whatſoever Title diſtinguiſh'd, are always to be avoided.

The Purgations or Cleanſings of the outward Skin by Frictions, Lotions, Baths, Fomentations, Swimming and Deterſions are of excellent Uſe.

But the Affections of the Mind or Paſſions are not altogether to be ſuppreſs'd, neither too much excited or ſtir'd up, for it raiſes a Stupidity or turns the Circulation: Hope and Deſire are found to be ſalutary to the Body.

ΠΡΟΦΥ΄ΛΑΞΙΣ.

The Prophylactick or Preventing Part of Phyſick.

Diſeaſes are prevented, when at the ſame time the firſt Signs of their future Approach are diſcover'd, and you preſently have recourſe to their Cauſes.

But the primary Prophylactick Remedies of Diſeaſes riſing ſuddenly, are indeed theſe; Abſtinence, Reſt, warm Liquors, then gentle and ſometimes conſtant Motion, till a breathing Sweat is rais'd, afterwards a large Sleep or Reſt with the Body being well cover'd; by this means the groſs or thicker Fluids are diluted, the Veſſels relaxed, and the noxious Humours excerned.

Neither is there any thing elſe, that defends the Body better againſt the Force of external Cauſes, than if any one in Spring time caſts off his Winter Cloaths by degrees, and again increaſes his Summer Wearing early in the Autumn Seaſon.

We ought alſo to moderate our Diet at certain times, which may be done by theſe few ſimple Rules: In *Summer*, a light, ſoft, looſening, moiſt Diet is proper, of olerant Herbs, Fruits, Milk, Broths, with plenty of aqueous or diluting Liquors, and with gentle Exerciſe of the Body avoiding all that is violent.

In *Winter*, a ſolid dry Diet is beſt, that is acrid with Spice and Salt, roaſted Meat, Bread more baked, with a ſparing quantity of pure unmix'd Wine, and a more vigorous Exerciſe of the Body.

In *Spring* and *Autumn*, your Diet is to be moderated in a middle Temperament betwixt *Summer* and *Winter*; conſidering likewiſe into which of theſe Seaſons you more or leſs incline.

Diet to prolong Life.

A Thorough ſound Body, by Actions that are inſeparable from a healthful Condition of Life, by degrees is ſo chang'd, that the ſmalleſt Fibres become rigid or ſtiff, but the fineſt Veſſels grow into concreted Fibres, not pervious to the Humours, the larger Veſſels harden and cloſe, but they are all drawn together, growing each to the other, from whence comes Dryneſs, want of Motion, and a Decay of Age: Here the Offices of the little Veſſels are deſtroy'd, the Humours ſtagnate in them, move ſlowly and coaleſce among themſelves, and with their proper Canals dwindle away; Digeſtion is weaken'd, Reparation wanting, the groſs Humours run ſlowly, only thro' the larger Veſſels, and maintain Life ſingly without its Animal Actions; from whence at laſt, Death in Old Age becomes inevitable thro' theſe Changes, and flows even from Health it ſelf.

Therefore this ſooner happens, if the Actions of a healthful State and Condition have been more violent, but later if they have been moderate: And in the Moderation here of a juſt Mediocrity, Old Age ſeems to be promis'd as poſſible to be attain'd by Art, eſpecially if the *Hygieneal* and *Prophylactick* Part conſpire ſo by their Effects, that they do not interrupt or moleſt this Deſign; almoſt all the reſt return hither, if they have been gather'd together.

All theſe Conditions ought to be join'd to the Body, as much as that can be gain'd by any Art: The Actions of the Body being thus inſtituted, that the Reparation of what is loſt or expended, the Aſſimilation of what is taken in by the Mouth, as Meat and Drink, the Term of a requiſite Encreaſe, the Expulſion of the *Fæces*, are eaſily, gently, and conſtantly made, from whence moderate conſtant Labour is ſerviceable upon a ſlight Laſſitude or Wearineſs, being more gentle in Childhood, increaſing by degrees with the Strength of the Body, and decreaſing continually in Old Age.

Thoſe Operations or Workings of the Mind, are to be choſe which are moſt agreeable to every Man's particular *Genius* or Inclination, but theſe are to be directed, that by preſerving a Moderation, the Spirits may not be ſtupified or numb'd with Reſt, or diſſipated and waſted by too much Motion; in Youth ſharp Contention ſhou'd be forbid to be exerciſed except by degrees, and which ſenſibly increaſing in Age, is more to be moderated.

Simple Food that is dry, hard, tenacious and difficult to Putrefaction, but not acrid; *Vegetables*, as Bread, Roots and auſtere Fruits; lean ſalted Meat of *Animals*, or Fiſh prepared after the ſame manner,

have

have been approved. In Childhood, Milk, by degrees Bread, then more ſolid Food is adminiſtred, whereby Age grows to be more ſtrong, and at length returns by degrees to the Diet of Children again.

A ſparing Draught of good cold Water, ſerving only to dilute and quench Thirſt, is commended for the greateſt Example of producing theſe Effects: Ripe, fine, ſoft Malt Liquor and Wine may be admitted with moderate Uſe, but too much is hurtful. In Youth, Milk, by degrees things more diluting, then Water in the Vigour of Age, but in Old Age a little ſoft Wine may be admitted.

In the interim, the greateſt Abſtinence, the moſt accurate lean Diet, rarely or now and then interpos'd, are of wonderful Uſe.

When Age increaſes, the Introduction of Nutriment, by applying Externals, is made from Vapours or Fumes, Fomentations, Baths, Clyſters, Unguents, *&c.*

A pure, campaign, mountanous open Air, as well as a ſhady one in Woods, and that more cool in Iſlands, is commended before all others.

The Excretion of groſs Humours about Old Age, is to be aſſiſted with greateſt Safety by thoſe things which moſt excite the Fibres, and looſen the *Fæces*; where Saffron, Salt, and Aromaticks are mix'd with Honey and good Wine.

The Changes of the Humours that are almoſt radical by Reſolvents, from thence the ſucceeding Excretions of them, as the received Cures by the virtue of Quick-ſilver, or by attenuating, drying, ſudorifick Diet Drinks, often diſpoſe the Body to a ready Expulſion of the old and the Reſtoration of a new vital matter, from whence prudent Art by this means conducts us to long Life.

Vapours, Fomentations, Unguents, Baths, Clyſters, from ſweet Odours, from Milk, Broth, Oil, living Animals, that are egregious Remedies for aged Dryneſs, Checks to Death and Helps to long Life, are yet injurious to Youth.

But yet from what hath been ſaid, it is plain, that thoſe things which render the Body large, hard, conſtant and fit to bear Age, and keep off the ſtrongeſt Diſeaſes, and eſpecially the Sharpneſs of the moſt ſprightly Wit from being dull'd and impeded in the ruder Organs are not the Cauſes of gaining perfect Health, or Helps to procure long Life.

But the vaineſt Boaſtings, without any Foundation in reaſon, or Faith of Experiments, are thoſe firm Promiſes which are recommended to this end; to wit, the Uſe of *Helmont*'s firſt *Ens*, the *Elixir Proprietatis* of *Paracelſus*, the fam'd Tincture of the *Adepts*, the firſt *Ens* of Metals, Foſſils, Animals, Vegetables, the repeated Purges by the Leaves of black *Hellebore*, Spirit of *Sulphur* by the Bell, Spirit of Flowers of Roſemary, the attractive Virtue of a Spirit drawn from the Body of a ſound young Man, of long-liv'd Animals, *&c.* for renewing the Parts, as alſo Sigils of Planets producing Life.

Neither is it very likely, that we can by the beſt method protract Life to numberleſs Years, as the Chymical Adepts wou'd make us believe; nay, all theſe things are confuted by their own Experiments.

ΘΕΡΑΠΕΥΤΙΚΗ΄.

The Therapeutick or Methodical Part of Healing.

THis laſt Part of the Inſtitutions of Phyſick teaches us general Precepts, which ſet forth how a Phyſician in the Cure of the Sick may acquit himſelf of theſe Four Duties: Firſt, to preſerve Life, 2ly, to take away the Cauſes of a Diſeaſe, 3ly, to remove the Diſeaſe it ſelf, and 4ly, to expel or drive away the preſent Effects of the Diſeaſe.

That theſe Four may be perform'd, the Body of the Patient ought to be chang'd; wherefore there are Inſtruments required, from the Efficacy of applying which, the neceſſary Alterations are made; and theſe are call'd Helps, Remedies, Succours or Medicines.

But theſe Remedies are apply'd to every particular Patient ſo, that there may be made a neceſſary Change in him; wherefore the Phyſician ought to know firſt of all, what ought to be chang'd in him, and then by what Aſſiſtance he is to do this; and therefore he ought to know the Effects which will follow from theſe Applications on the Patient; both which can only be learnt from thoſe things which are known to him in the ſick Perſon by his Senſes, or by accurate reaſoning, that from thence he may behold the Action ſought for, and the Remedies for it.

That very thing, whatever it is, that is thus diſcovered, ſo inſtructs the Mind of the Phyſician, that it is called *Indicans*, diſcloſing or detecting a thing; but the Intellect of the thing known rais'd in the Phyſician, is call'd an *Indication*; and that which is known to be done, is call'd *Indicated.*

The indicating matter may be all that which is known in the ſick or about him, preſent, paſt or to come, ſo that it produces this Knowledge wherefore it is found manifold.

Yet all that may be aſſign'd, firſt, To Life remaining in the ſick Perſon, the Cauſes thereof, its Nature, Conſequences and Degrees. 2ly, To the Diſeaſe preſent in that, its Cauſes, Nature, Conſequences and Symptoms.

For from all theſe the Phyſician learns, firſt, What is to be done that he may preſerve the preſent Life;

that he may recruit or reſtore what is loſt; and that thoſe things may be removed which deſtroy Life, or is able to leſſen and abate it. 2ly, What Inſtruments are to be choſe for this Work, how they ought to be adapted and apply'd in certain Order and Time.

Laſtly, That Part of Therapeuticks which ſets forth Rules, by the Demonſtration of which, the things *indicating* and *indicated* may be detected, is the *Method of Healing*, of which here follows a ſhort *Compendium.*

The Method of Healing.

LIfe continuing in every Patient, alſo the Cauſe and Effect thereof remaining; theſe things are call'd natural, according to the Laws of Nature, and oftentimes Nature it ſelf.

But ſince Life always acts, there will be in the Sick ſome Actions exceeding which at firſt accompanied Health, and therefore may be judg'd the Remains of former Health and the Effects of Life preſent, which may paſs under the Name of Strength.

Which being rightly examined, are found to depend on the Motion of the Humours abounding thro' the Veſſels, whatſoever that Motion hath been.

But that reduced to the leaſt things poſſible, at leaſt puſhes on the Motion of the Humours circularly thro' the Heart, Lungs and *Cerebellum*; in which conſiſts the minuteſt Strength of Life, which alſo from hence may be augmented in various degrees.

This evidently appears ſhou'd be known and diſcover'd by the Phyſician, towards the Preſervation of the Sick, and reſtoring him to perfect Health; which Knowledge alſo is call'd a vital or conſervatory *Indication.*

The Cauſe of a Diſeaſe being known, indicates the Correction or Removal thereof: The firſt Cauſe is judg'd from its Effect, and therefore this *Indication* is call'd προφυλακτικὴ or *Preſervatory,* as giving a turn to an approaching Diſeaſe, by eradicating or taking away the Cauſe.

But a preſent viſible Diſeaſe indicates, that it ſhould be removed; which Indication is call'd *Curative* or *Therapeutick.*

Laſtly, the known Symptoms, if they are ſo dangerous and troubleſome, that the Cure of 'em cannot be differ'd, till the Diſeaſe on which they depend can be healed, they *indicate* a Mitigation and particular Cure; and this *Indication* is call'd an urgent, neceſſary or palliative Cure.

From whence now it is evident, we cannot *indicate* how to act and do right, unleſs we know firſt of all what Life is, the Cauſe, State, Strength and Effects thereof; and alſo from the Survey of a Diſeaſe, its Cauſe, Condition, Strength and Effects.

Then likewiſe muſt be indicated what is to be done, and from thence by what means, with what Doſe, in what Condition, Time and Order.

But ſince all theſe Particulars are in one and the ſame Patient, ſo that every Particular indicates what is ſingularly to be done, and alſo they ſhow the ſingular Helps that are to be apply'd; it often happens that one of theſe indicate ſome other thing than the Reſt, and ſometimes requires that ſomething contrary ſhou'd be done, or ſome Remedy given that is quite oppoſite to what was required by another Indication. Therefore this is an uſeful and celebrated Doctrine of *indicating,* contra-indicating, repugnant, permittent, co-incident, *&c.* which may be eaſily underſtood from what hath been ſaid.

Therefore when it happens that Contraries meet together, the Phyſician's beſt way is to have recourſe to medicinal Axioms, which determine him what he is to do or chooſe from doubtful things, therefore they remove this otherwiſe ſeeming Difficulty, after this manner.

1. Whatever is indicated in the Sick, that requires Conſervation or Ablation.

2. Whatever is found according to Nature, that is always to be preſerv'd.

3. Whatever is diſcovered contrary to Nature, that is to be taken away.

4. It conſiſts of thoſe things with which the Body is nouriſh'd.

5. Like things are to be preſerv'd to like.

6. The Cauſe curing by Medicines is Life exceeding the Diſeaſe; and a *Temperament* proper to every one, without which, Medicine is a ſluggiſh and unactive Nothing.

7. Therefore where a *vital Indication* offers, and alſo what attends it, there will always be what will ſatisfy the firſt.

8. But where an unequal *Indication* urges likewiſe, then it will be always enough to ſatisfy the greateſt.

9. Thoſe things that do good and harm, are particular *Indications.*

10. Contraries are removed by contraries.

11. Nature is pleas'd with things accuſtom'd to, and bears the contrary with great Uneaſineſs.

12. In the greateſt or ſtrongeſt Diſeaſes, the ſtrongeſt or moſt efficacious Remedies are to be tryed, and that ſpeedily.

13. In milder Diſeaſes, the moſt gentle Medicines are to be given leiſurely and often.

A Vital Indication.

THE Condition of Life is known from regarding the Strength thereof.

Theſe are diſcover'd by the Effects of it exercis'd in the ſick Body.

Which are the ſurviving Uſe of the Functions as yet remaining.

But theſe are the Propulſion of the Humours thro' the Veſſels and the *Viſcera.*

In which there is required a due quantity of apt Humour, and a continued Action of this thro' the Veſſels themſelves.

The Action of the Veſſels alone depends on that Contraction of the Fibres, by which theſe being drawn aſide from the transfluent Humour, and diſtended arch-wiſe ſhorten themſelves, being diſpos'd into right lines, they approach towards the *Axis* of its Cavity, and propel the Humour contain'd in them; therefore theſe are properly the Strength of the Veſſels variouſly determin'd according to the Figure of them.

But it appears that theſe require the elaſtick and contractile Force of the Fibre, which is reſiſted or oppos'd by its Separation.

And likewiſe they expel by the vaſculous Membranes of the larger Veſſels, and Influx of ſubtil Humour moved into the ſmalleſt nervous Veſſels, and others alternately, according to the Pulſation of the groſſer Humours by the largeſt Veſſels.

Cardiacks and Diet for the Sick.

BUT ſince the *Heart* is the principal Cauſe of all thoſe Motions on which the vital *Stamina* depend, hence thoſe Helps or Aſſiſtances which do good and bring Relief to the vital Indication, are with ſome juſtice call'd *Cardiacks*, tho' they do not immediately relieve the Heart alone.

We ſhall find theſe to be various, but yet they may and ought to be reduced to certain *Claſſes*, to wit, firſt, ſome of them reſtore a due quantity of ſound Juices in the Body: 2ly, Others give a vigorous Strength to the Tone of the Fibres, and procure to them a requiſite Elaſticity. 3ly, And ſome of them increaſe the Quantity and Motion of the nervous Juice, that from the replete minute Veſſels, the larger may be ſtrengthen'd and confirm'd. Laſtly, They ſtimulate the moving Fibres, and ſo move the unactive Veſſels and ſluggiſh ſtagnating Humours.

To the firſt Claſs of theſe I refer the Liquors that are firſt, endowed with a Faculty of nouriſhing the Body of the Sick. And 2ly, thoſe that are ſo prepared before-hand, that they ſhall not ſtand in need of chewing or Digeſtion, either in the Stomach or Inteſtines, which is wanting in the weak and exhauſted *Patient*, or at leaſt operates too ſlowly. 3ly, They conſiſt of ſuch a matter, which does not eaſily corrupt or putrefie of its own accord, when it wants ſufficient Strength to expell it quickly, becauſe the Actions of the *Viſcera* are weak at this time, or while ſomething of a morbid and corrupt Humour is mix'd with the Aliment in the Body. 4ly, And laſtly, that they be not of ſuch a Nature, as is ſimilar to the morbid Humours in the ſick Body, and which feeds and increaſes the Malignity and the Cauſe of the Diſeaſe, and produces the *Symptoms* thereof.

Such *Cardiacks* are *indicated* to be adminiſtred to the Want of Strength, together with the Signs of the Emptineſs of the Veſſels.

But the particular matter of them is requiſite to be underſtood, if the Phyſician would know accurately the proper Diſpoſition of the vitious Humour, which offends by being predominant in the Sick; for then we are to make choice of ſuch Cardiack Materials, as are oppoſite or contrary to that detected Vice, but this Doctrine is to be met withal in the *Semmeotical Part* of Medicine.

Therefore where the Humours incline to an *Alcaline* Nature, then the Cardiack Materials are beſt found, in a thorough Decoction of frumentaceous Grain and Seeds, prepared with the pureſt Waters well boil'd, that from thence may be made *Ptiſans*, *Panada*'s *Flummery*, &c. the laſt of which is moſt recommended for Uſe: All theſe frumentaneous and leguminous Preparations are of greateſt Service for the Diet of the Sick, together with *Emulſions* and *Decoctions* of Almonds, Rice, *Piſtachia Nuts*, *Poppy Seeds*, &c. 2ly, Of mature, grateful, ſharp or ſweet Fruits, eſpecially the ſucculent kind, or ſuch as are preſerv'd with Sugar, or converted into Jellies; as tart vinous Apples, ripe Quinces, Oranges of all kinds, Pears, Peaches, Nectarines, Apricocks, Prunes, Plums, Cherries, Mulberries, Raſpberries, Currans, Strawberries, *&c.* 3ldy, From pulpy, ſoft Fruits, eaten raw, or pickled, as Cucumbers, Gourds, Melons and Artichoaks. 4ly, From milky olerant Herbs, as red Cabbage, Succory, Purſlane, Sorrel, *&c.* 5ly, The Milk of Animals during the Summer Paſturage, with the Whey, Cream and Butter-milk.

The Choice, Preparation, Quantity, Occaſion and Order of adminiſtring all which are indicated from the Age, Sex, Conſtitution, Cuſtom, Diet, Cauſe and Diſeaſe of the Patient, together with the Continuance and *Symptoms* thereof, the Seaſon of the Year, Temperature of the Weather, and the like are to be conſider'd.

But if there be an acid Diſpoſition found to predominate, then theſe *Cardiacks* are to be met with in the animal Kingdom, whoſe firmer Parts are to be render'd apter for Nutrition by boiling in Water, to Broths, Jellies, *&c.* to this Head alſo, Eggs and thoſe Things which ariſe from a various Compoſition of different Parts are to be refer'd; in the Uſe of which, all thoſe things are to be obſerv'd, which have been before hinted.

If a muriatick Acrimony abound, thoſe Things are convenient, which are deſcrib'd under the firſt Head of Diet, to wit, Corn, Fruits, Seeds, Herbs, *&c.* that are devoid of Salt and Vinegar; ſo likewiſe where the acrid, oleous matter offends.

To the next Claſs of *Cardiacks*, thoſe things are thought to pertain, which firſt, being applying to the flaccid Fibrils of the Veſſels, and adhering to them, render them more rigid, ſuch as are all theſe in which a moderate aſtringent Virtue is commended, as Apples and Pears that are auſtere, Quinces, Pomegranates; Fruits that are gently eager or tart, Horns, Shrubs, *&c.* as all the kinds of Myrobalans, Acorns, Barberies, Myrtle-berries, Acacia, Roſes, Services; Herbs as Cinquefoil, Tormentil, Burdock, Plantane, Purſlane, Pimpernel, Biſtort, *&c.* Flowers of Pomegranate, Roſes; the Pomegranate Rind, Peruvian and Tamarisk Bark; Roots of Capers, Myrobalans, Juice of Acacia, and Sloes, Maſtick, Frankincenſe, Dragons Blood, Gum Lac, auſtere Wines, *&c.* Earths or Metallick Bodies, as Bole, Chalk, Lemnian and Japan Earth, Allum, Vitriol and Iron or Steel. 2ly, Thoſe things which joyn together the reſolved or broken Fibres of the Body, ſo as to make them one compact Subſtance one with the other; ſuch as are all the forementioned, and eſpecially thoſe which are found to be very binding, as the auſtereſt Vegetables and Foſſils, unripe Fruits, calcined Vitriols, calcined Bones, *&c.*

Such things are indicated to be neceſſary, when there is a great Weakneſs throughout the whole Body, together with Paleneſs, Coldneſs, Stupidity, a ſerous Stench, and a remarkable Weakneſs of the Body.

But in adminiſtring theſe things a prudent Caution is to be obſerved, eſpecially upon the Conſideration of Experience, from whence we know that auſtere things acting too much upon the firſt Paſſages, make it difficult for them to be convey'd into the internal Parts.

But the third Claſs of *Cardiacks* ſeems to conſiſt chiefly in the moſt ſubtil and fine Part of ſound, young, vigorous Animals, plentifully convey'd into the weak Body to ſupply the defects thereof, this appears to be done, firſt, From expiring Exhalations that ariſe from thoſe Bodies, while they are apply'd to the ſick Body, like that of Fomentation. 2ly, By ſucking Milk from the Breaſts of any Creature. 3ly, By taking the Gravy ſtewed from the Fleſh of an Animal. 4ly, By odorous ſoft Vapours of Saffron, Jaſmine, Citron, Orange Balm, *&c.* 5ly, By fragrant ſweet ſcented Wines, ſufficiently volatile and briſk.

Theſe *Cardiacks* are known to be neceſſary, when the Strength of the Body is known to fail, and alſo there appears evident Signs of Languidneſs thro' all the muſcular Motions, and likewiſe the Exerciſe or Uſe of the Senſes is much impeded, but eſpecially if there then appear evident Signs, the Humours being groſs and thicken'd in all the Veſſels.

The laſt Claſs of *Cardiacks* will be found to be very large and numerous, and therefore ought to be ſubdivided to render them more eaſily underſtood. Firſt, then they are the freſh Juices of all thoſe Fruits, in which there is a grateful, ſharp, penetrating, refreſhing Taſte, any ſweet fragrant Smell, and alſo any Power of affording Nouriſhment: The firſt of theſe are Oranges both ſweet and ſour, ripe Pomegranates, fragrant Apples, *Ananas*, or the King of

Fruits; Melons, Cherries, Strawberries, Mulberries, Raſpberries, Currans, black Cherries, Prunes, Peaches and Nectarines, and many others of the like Nature, which are the beſt ſtimulating Medicines in hot and dry Weakneſs. 2ly, The diffuſive Odours of the moſt fragrant Vegetables, as Orange Citron and Limon Peel; Flowers of Borage, Betony, Bugloſs, Saffron, Jaſmine, Lilly of the Vally, Galbanum, Balm, Myrtle, Saſſafras, Hyacinth, Rhodium, *&c.* or the more acrid and hotter kind, as Southernwood, Wormwood, Amomum, Dill, Angelica, Anniſe, Mugwort, Cyprus, Calamint, Cummin, Coriander, Cloves, Cinamon, Cardamoms, Dictamny, Galingal, Hyſſop, Maſterwort, Juniper, Lavender, Bays, Mace, Mint, Majoram, Marum, Maſtick, Nutmegs, Penny-royal, Rue, Savine, Sage, Thyme, Ginger, *&c.* to which may be added the Gums of Ammoniacum, Bdellium, Elemi, Galbanum, Myrrhe Opopanax, Sagapenum, Aſa fætida, Camphore, Storax and liquid Ambar. 3ly, Particular Odours that produce ſingular and wonderful Effects on many, as are found in Ambergreece, Benjamin, Caſtor, Musk, Storax, and Civet. 4ly, From all theſe together, received and acting in the Body. 5ly, Here is a numerous Series of thoſe things which ſtrangely affect the Nerves, being endowed with a volatile, thin, acrid, ſtimulating Force or Virtue; and may be reduced, firſt, To Acids, as are Wines and Vinegars, as well ſimple as aromatick. 2ly, To things call'd ſpirituous, as are all ſimple, vegetable Spirits, prepared by Fermentation, or replete with the Odours of Aromaticks. 3ly, Simple, Volatile, Alcaline Spirits, or united to Spirit of Wine and aromatick Oils. 4ly, Diſtill'd, Aromatick Oils, or thoſe by Expreſſion. 5ly, Compounded ones of which there are without Number, according to the Pleaſure of the Maker; from which Epithemums, Liniments and Medicinal Drinks are made, to theſe we may alſo reckon ſimple and compound, diſtill'd, aromatick Waters, and odorous, artificial Balſams, ſimple and compounded Cardiack Confections, aromatick, oleous Spirits, volatile, oily Salts, aromatick and ſpirituous of various kinds; Tinctures prepared with Spirit of Wine, from the moſt fragrant Aromaticks, and many others according to every Man's particular Inclination.

In the uſe of all theſe, there is need of great Caution, for being adminiſtred to the Body, where the Humours lodge in the Veſſels, not diſpos'd to an eaſie Tranſmiſſion of the Fluids, they excite a Motion which tends to ſudden Deſtruction: There we muſt have regard again, to all the Cautions laid down.

This kind of Cardiacks is indicated from the want of a circular Motion of the Fluids, which Deficiency ariſes, from the Unactiveneſs only of the Fibres, together with the gentle Humours and Veſſels apt for Tranſmiſſion; but what ſingle *Species* is to be choſe, we are taught from conſidering the Nature and Diſpoſition of the Diſeaſe, and the Cardiack to be adminiſtred. But now having done with the Diet of the Sick, we ſhall proceed to the Cure of a Diſeaſe.

ΠΡΟΦΥΛΑ΄ΞΙΣ ΘΕΡΑΠΕΥΤΙΚΗ΄,
Or the Therapeutical Prophylaxis.

THE Cauſes of the Diſeaſes being accurately known by their Signs, *Indicate* the Ablation or Removal thereof, therefore if they are conſider'd to lodge in the firm or ſolid Parts they require, firſt, the taking away the deſtructive or injurious external Cauſe, or 2ly, the Union of the Parts morbidly ſeparated, or 3ly, the Separation of the Parts morbidly united, or 4ly, the Removal of the Superfluous, or laſtly, a Supply of what is wanting.

Theſe *Indications* occurring or meeting together in the larger and more ſenſible Parts, require the Aſſiſtance of *Chirurgery*, which is wholly imploy'd, that by its Operations artfully perform'd by the Hand, or by the Application of Remedies, theſe five things mention'd in the preceding Paragraph may be compleated; as may be ſeen from the beſt Authors, *Paræus*, *Hildanus*, *Solingen*, *Dion*, &c.

But if they lodge in the internal Parts, they are to be oppos'd by other Remedies, altho' analogous thereto in their final Operations; amongſt which ſince Poiſons are the firſt, we ſhall firſt of all treat of them.

'ANTIΔOTA, *of Antidotes.*

THE quickeſt Poiſons taken into the Body, or apply'd to it, being made the Cauſes of Diſeaſes by their own proper Strength or Efficacy, or from Corruption, firſt brought into the infected Parts, *indicate* firſt, The taking away of the poiſonous Cauſe. 2ly, The Correction of the Poiſon now received, or unavoidably to be admitted. 3ly, The Expulſion of it from the Body. 4ly, The Mitigation of the Symptoms. 5ly, The Arming or Defence of the Body, againſt the force of the Poiſon taken in or apply'd.

The Cauſe that ſpreads or diffuſes the Poiſon, and communicates it to the Body, or mixes the *Miaſms* to the Atmoſphere, or being now apply'd to the Body, inſpires the *Miaſms* if this be known to the Senſes, it is eaſily removed. Firſt, By taking away the poiſonous matter, and that firſt of all, by burning it out with large living Fires. 2ly, By correcting the Air, which brings to, and conveys the *Miaſms*, which is beſt done by thick Vapours ariſing from ſuch combuſtible Fuel, the Virtue whereof is oppoſite to the known Poiſon, as in the Plague, from cauſtick, alcaliſate, putrid Vapours, the Fumes of Vinegar, Spirits of Salt, *&c.* in acid, poiſonous Exhalations, the diffuſing of ſpirituous, alcaliſate Odours are ſerviceable. 3ly, By changing, diſſipating and renewing the Air by a Wind made by Art, eſpecially, if it can be tranſmitted by large Fires, according to the Art of *Hippocrates.* 4ly, By flying from it, or moving from a lower Situation to a higher or mountaneous Part. Laſtly, by taking away or correcting that venemous matter, which is received in or apply'd to the Body.

The preſent known Poiſon is corrected by the Application of ſuch things, which can render thoſe Qualities of it unactive, with which it hurts the Body.

Which firſt, are hitherto ſcarce known in many of them, except only from the poiſonous Faculty hardly evident, unleſs by the Death of the Perſon infected. 2ly, They are diſcover'd in others by their wonderful, and not yet explain'd Effects. 3ly, In ſome, by thoſe Effects that are to be met with in other remarkable Diſeaſes. 4ly, and Laſtly, They are underſtood in ſome few from the firſt Reaſon, while from the known Nature of the Poiſon they are eaſily foreſeen.

The former which are ſaid to hurt the whole Subſtance, accurately *indicate* contrary Remedies, yet equally as little underſtood as thoſe Poiſons, as to the Knowledge of their Effects. Theſe are properly call'd Antidotes, Alexipharmicks, Treacles, *&c.* and by the Greeks, ἀντίδοτα, ἀντίδοτοι, ἀλεξίκακα, ἀλεξιφάρμακα, ἀλεξιθήεια, θηείακα, which being only known from Experience, is to be ſought for in the Hiſtory of Poiſons.

The Second Things ſaid to come from an occult Quality, in like manner, requiring wonderful Remedies call'd Specificks, ſcarce to be found except by mere chance, are refer'd to the Hiſtory of Poiſons, from whence they are to be fetch'd.

The Third before they kill, while they produce morbid Effects, with which the Fabrick of the Body is ſo broken, that in certain known Diſeaſes they require, that ſuch Medicines ſhould be adminiſtred, which Phyſick hath been obſerved to avail in the healing of ſuch Diſeaſes, which diſtinguiſh themſelves by the like Effects.

If Poiſons are known to be apply'd to the Body, then there will be an occaſion for adminiſtring thoſe Remedies, which have immediate and ready force and Power to enervate and weaken the known Malignity ; but theſe are however ſtrong oppoſite Malignities themſelves, and therefore as likely to do Miſchief to the Body, except the Poiſon that was firſt there.

From whence we learn to know the Nature of Poiſon from natural Hiſtory, and the Cure of Poiſons, as well from Mechanical Science, as Chymical, and laſtly, from the Effects diſcover'd by Anatomy. And Knowledge ariſing from hence judicates this.

And from that *Indication* is known the matter, Preparation, Doſe, Application and Direction, or Government of a corrective Remedy.

But the firſt and moſt common Antidotes almoſt againſt all Poiſons, and therefore of the greateſt uſe where the Poiſon taken is known, but not the particular Nature of it, are theſe, pure Water a little more than Blood warm taken quickly, and for a time, or elſe injected into the Body ; as alſo a weak *Lixivium* or *Lee* of common Water and Venice Soap, us'd in the like quantity, manner and time, or elſe ſimple Water with *Soap* and *Oxymel*, adminiſtred upon the like occaſion, ſweet, freſh drawn Oils by Expreſſion, from fat, farine or frumentaceous Seeds taken in good quantities, and that preſently, or injected, or fat Broths made from the Fleſh of Animals; eſpecially the Vinegar if ſoon apply'd, and laſtly *Opium*. But there is not hitherto known any General Prophylactick Antidote, but it is repugnant to it ſelf.

In giving particular Antidotes, there is need of the greateſt Prudence; for ſince theſe prevail by their ſingular Virtues to correct this or that Poiſon, they have notwithſtanding a force or violence equally as great or greater, than that which they overcome. And therefore theſe meeting together in the Body, mutually deſtroy themſelves become unactive, and do no great hurt; but if they are there ſingly, they are found to be equally noxious as the Poiſons themſelves, which they are adminiſtred to ſubdue.

But all theſe Antidotes whether univerſal or particular were, may and ought to be ſo prepared, apply'd and directed, that they may be ready preſently and conſtantly by their uncorrupted Virtues, to pervade thoſe places in which the *Virus* or Poiſon lodges, and there to conquer and overpower it: Therefore the Phyſician ought to have a Claſs or Stock of Materials always ready or at hand, which takes in all the Diverſity of Applications, which are firſt, Air, Fumigations, a dry or moiſt Vapour apply'd to the Lungs; Draughts, Clyſters, *Epithemums*, Baths, Fomentations, Injections for the Womb, Bladder, Jaws, *&c.*

Poiſon being receiv'd, is expell'd from the Body. Firſt, By leſſening the Strength of it in that place, by which it may be more ſafely diſcharg'd, where it is leſs hurtful, and paſſes out of the Body, and does leſs Injury to the *Viſcera*; for then it is driven by the Vigour of Life and the Efficacy of Medicine, till it is forced out; and that is perform'd at this day by means of great, large Cupping Glaſſes, apply'd with a great deal of Fire, and often renew'd, by warm Fomentations and ſtrong Emollients; by Leeches, Scarifications, Frictions, hot Things and Emplaſters. 2ly, By magnetick Attraction, by which the poiſonous Body being drawn out by a ſingular Energy, the Patient is deliver'd or freed from it; ſuch as is ſaid to be done by the Fleſh of venemous Beaſts, the Serpents, Stone, &c. 3ly, From every Medicine that powerfully dilates and moves; ſuch as are ſudden Vomits, quick Purges, ſtrong Sweats, and ſometimes good Diureticks: Whence *Diaſcordium*, *Mithridate*, *Treacle*, *Orvietan* and *Opiate Confects* are of Service; yet to which you ought to give leſs Credit than to Univerſal *Therapeutick* or *Prophylactick Antidotes.* 4ly, By applying to the Part affected with the Poiſon as ſoon as may be, leſt it ſpreads, which is beſt done by an actual Cantery or a hot Iron.

The fierce cruel Symptoms of the venemous Effects growing more ſenſible, according to the Doctrine of Pathology, are not difficult to reduce to their *Claſſes*; and then they may be cured, as if they had been ſome particular Diſeaſes, of which we ſhall ſpeak hereafter.

The Body is fenc'd or ſecured againſt the Application of Poiſons. Firſt, By taking largely general and particular Antidotes, which are ſafe if beforehand, the Nature of the Poiſon is known againſt which we wou'd provide. 2ly, By anointing that Part of the Body which is more fear'd may receive the Infection. 3ly, By keeping all Parts in an equal Perſpiration; but there is no ſuch univerſal Preſervative yet known, tho' there are many boaſted of.

But what hath been hitherto ſaid of *Poiſons*, may be likewiſe underſtood of the *Plague* and other Contagions: But what hath been ſaid, will appear more intelligible from the ſubſequent, and perhaps not uſeleſs Compendium of particular Poiſons and their Antidotes.

For firſt, ſome Poiſons may be refer'd to Things, manifeſtly acrid, but ſo that the Acrimony is ſingular, and yet cauſtick, creating a *Gangrene* and putrefying; ſuch are *Cobalt*, yellow, red and white ſublimate *Arſnick*, *Realgar*, the *Armenian Stone*, *Lapis Lazuli*: Theſe internally or externally apply'd inflame, corrode and raiſe Pain, Heat, Dryneſs, firſt in the Places firſt hurt, and then in the whole Body, hence they create the moſt acute inflammatory Diſeaſes in the Mouth, Jaws, Gullet, Stomach and Guts, procuring *Nauſea's*, Vomitings, Dyſenteries, *Cholera Morbus* and the Iliack Paſſion; producing a livid Paleneſs, from whence comes *Vertigo's*, Convulſions and Death, but avoiding the laſt, Paleneſs, Palſy and Contractions, they *indicate* or declare the immediate uſe of warm Water, Vinegar or Honey, conſtantly follow'd by drinking, injecting, bathing, *&c.* If it can be thrown out by Vomiting or Stool, that is better to be repeated often, fat Broths, Milk, Oil and Butter are profitable; after that, they require the daily uſe of laxative, ſoft, fat things, as well by the Mouth, as bathing or waſhing therein.

The like almoſt of theſe are from Vegetables, as Aconite, Anacardium, Anemone, Apocynum, Arum, Cataputia, the black Chamæleon, Colchicum, Crown Imperial, Cyclamen, Dragons wort, Spurge, Elaterium, Euphorbium, African Marygold, white and black Hellebore, Hermodactils, Hyacinth, Spurge laurel Mezereon, poiſonous Honey, Oleander, Ranunculus, Ricinus, Scammony, Oily Seeds being made acridly rancid by continual Decay, Tithymal and *Thapſia*; the Effects of which are almoſt the ſame with the fore-mention'd, but the *Indications* perfectly ſo.

There are other violent and acrid Poiſons, but yet which lodge as it were Viſcous in the Stomach, and ſo effect the Brain and Nerves after a particular manner, as the *Chryſomel*, the great and leſſer aquatick Hemlock of *Geſner* like Parſley, Henbane, Nux Vomica, Oenanthe with the Smallage Leaf, and poiſonous Juice, Opium, Nightſhade, *&c.* producing *Vertigo's, Scotomies, Delirium, Madneſs, Nauſea, Vomiting, Dyſenteries, horrible Convulſions, Apoplexy* and *Death*; they *indicate* the preſent uſe of a Vomit ready at hand, Water, Oil, Honey, the *Acidulæ* taken in great quantities, and a conſtant Repetition of them; Baths, Clyſters, *&c.* the Diſeaſe being abated, ſtrong Sweats by Treacles and often repeated, then a ſoft, thin Diet.

There are acrid Poiſons with a manifeſt Acidity; as to wit, Spirits of Salt, Spirit of Nitre, Aqua Regia, Aqua fortis, Spirits of Sulphur and Vitriol, the ſame Acids united with metallick Bodies, as a Solution of Gold and its Cryſtals; a Solution of Silver and the Vitriol thereof, the *Lapis Infernalis*; a Solution of Quickſilver in Spirit of Nitre, Spirit of Salt, Aqua fortis, Aqua Regia, or the Calcination thereof with Oil of Vitriol; and hence comes red, white and green Precipitate, ſweet and corroſive, ſublimate, Calx, Turbith, Mineral; the Impregnation of Antimony with Aqua Regia, and hence the eſcharotick Calx. From theſe ariſe horrid Taſtes, acid, ſour Stenches, Inflammations, eating of the Fleſh, gangrenous eſchars Loathings, Vomiting, Dyſenteries, dreadful, cruel Gripes, Heart burn, Iliack and Chollick Pains, Tumours of the Glands, Salivations, Syncope's, Death. Theſe require Dilutions by aqueous things, blunting or ſheathing the acid points by Oils, inverting them by lixiviate, ſoapy Alcalies, abſorbing the ſtrongeſt Acids; but then when the Violence is appeas'd, the frequent uſe of Oil and fat Broths, with the Emulſion of the cool, oily Seeds.

There are other acrid Poiſons known to be manifeſtly *alcaline*, and they are the Aſhes of burnt Plants or Vegetables, made from thence into an Alcaly, as *Lime-ſtone* is by burning; Egg, Humours and Fleſh it ſelf putrefied together, and then the Salts ſeparated from them, are made by Sublimation of the Fire into fix'd Alcaly Salts, with *Lime*, *Lapis calaminaris*, *Chalk*, *Iron*, &c. but theſe create a quick, violent, fiery Inflammation, Corroſion, Gangrene, burning Pains in every Part, likewiſe unquenchable Thirſt, Convulſions, the acuteſt Fevers, cadaverous Smells, intimate Diſſolution of the Humours, Putrefaction of thoſe and the *Viſcera*, and laſtly Death; but they require in order to a Cure, a Dilution by aqueous Laxatives; an Obtuſion by oily, fat and unctuous Earths, an Inverſion by diluting, volatile Acids, and afterwards a continued Diet of cooling, acid, oily Emollients.

Some are frequently eſteem'd Mortal from a particular Acrimony, yet ſo that that Acrimony is ſcarcely otherwiſe manifeſt, than by its deadly Effect in Men, Braſs, the *Calx* thereof burnt, the *Calx* made by Corroſives, Flowers, *&c.* Crocus of *Antimony*, the *Calx* prepared by burning, and the Glaſs of *Antimony* made this way, the Flowers made by the Fire, or made by the help of *Sal Armoniack*, and then waſh'd. Theſe taken inwardly procure Loathing, Vomiting, Dyſentery, dreadful, cruel Pains of the *Viſcera*, *Spaſms*, *Tetanus*, *Syncope*, horrid Troubles and Death; they require for Cure diluting, emollient, obtunding Acids preſently apply'd, and that for a time upwards and downwards, externally and internally; then Opiates, and oily Medicines.

There are alſo reckon'd ſix acrid Poiſons, that are merely mechanical; the Diamond, Rock Cryſtal, Filings of Iron and Braſs, plumous Allum and broken Glaſs; theſe prick the Nerves, wound the Veſſels, excite *Convulſions* and *Hemorrhagies*, from whence come Ulcers and the like Miſchiefs, they indicate the ſpeedy and plentiful uſe of Oil and Butter.

Thoſe are Poiſons which deſtroy by ſudden or ſlow Death from conſtringing the Veſſels, thickning the Humours obſtructed or drying them up; as quick Lime, Plaiſter, the Minera, Filings or Calx of Lead, Ceruſe, white Lead, Glaſs, Lytharge; Fleawort Seed, Hip Spunge, Toadſtools, Agarick, Birdlime, theſe conglutinate and conſtringe or bind the Guts and Veſſels together, and create miſerable Diſeaſes after a wretched languiſhing Life, and at laſt Death; they demonſtrate the neceſſary uſe of Vomits, Purges, *&c.* of ſpirituous Acids, oily, ſpirituous Alcaly's, all ſaponaceous Things, which are to be us'd quickly and with ſome Continuation.

In the laſt place, thoſe are to be reckon'd *Heteroclite Poiſons*, that are Enemies to Life, yet whoſe Effects and Virtues have not yet been ſufficiently explain'd and well obſerved, and which notwithſtanding, by taking, Application, Stroke, Touch or Biting, occaſion Death; as the Cantharides, Spider, Tarantula, Aſp, Viper, Serpent, a venemous Worm call'd *Dipſas*, the Horn-worm, Scorpion, mad Dog, Toad, Lizard, the venemous black Beetle, Salamander, the Sea Hare, Sea Parſnip and the like, theſe produce certain, various, wonderful and unaccountable Effects: The Indication whereof is if internally taken, to evacuate preſently by Vomit, but above all to dilute by Water, and ſoften by laxative, emollient, oily Medicines; and ſuch as reſiſt Putrefaction, as ſpirituous, acid and ſaline ones. If they act from an external Stroke, Bile or Application, then the Eduction of the Venom is indicated by the poiſoned Part from ſucking, ſcarifying, burning or rubbing thereof; and alſo promoting ſtrong Sweats by penetrating Antidotes, that are Enemies to Putrefaction, by blunting the Venom by acid, ſaline, or other ſpecifick Counterpoiſons.

There are ſome things which ſuffocate or choak the Patient in a moments time under the form of a Vapour, as the Fume or Smoke of Coals, the Damp of a Coal Pit, or ſubterraneous Air long pent up for want of vent: The Steam of fermenting Wine, the volatile Duſt of a ripe *Fungus Toadſtool,* or *Puffrall,* the Fume of *Sulphur* and the like; theſe may be underſtood from what went before, affect the *Lungs* and *Nerves* when apply'd to them, that they are ſcarce to be cured.

But the remote Cauſes of Diſeaſes known to the Senſes, are eaſily changed or removed, for they indicate an Alteration in the *Six Non-naturals,* but if the ſame are hid, or kept more cloſe, yet being known by their mere ſenſible Effects; they *indicate* by theſe their *Phænomena* apt or proper Remedies.

For the Courſe of theſe *Phænomena* rightly obſerved, teaches us by what Aſſiſtance, Time, Order, Method and Way it is to be uſed, that the proximate Cauſe of a Diſeaſe in the human Body may be corrected or expell'd.

But alſo it teaches us the accurate Obſervation of them, what is wanting, and what thoſe ſupplemental things are which are to be adminiſtred.

And likewiſe what Motions are to be excited, ſupported, leſſen'd or brought to Reſt, in order to promote the ſame end.

Therefore the appointed and exact Knowledge of Effects teaches us exactly how to correct and remove the Cauſe.

From whence alſo is known, that hitherto there is a double way by which we are led into the Knowledge of the Cauſe, to wit, methodically or ſpecifically.

The methodical way, whereby the immediate Cauſe is known and taken away, makes uſe of theſe Helps or Aſſiſtances, firſt, accurately to explore and appoint the *Phænomena,* and diligently to obſerve the Courſe of Nature. 2ly, If Life is ſeen to languiſh or grow weak in the Performance of thoſe things, which are required to drive out the Cauſe of the Diſeaſe, to have recourſe to the Adminiſtration of *Cardiacks*, or by the Removal of thoſe Impediments which hinder the Evacuation of the preternatural Malady. 3ly, But where the Actions of Life are perceived to riſe too much, and therefore rather embarraſs than relieve the Cauſe of the Diſeaſe, then ſuch Temperance or Regulation is to be uſed, that they may be reduced to that degree of Strength as is here requiſite; which is effected by aqueous, diluting, ſoft Laxatives and gentle glutinous things evacuating the material Cauſe of their Force, as Opiates, Anodynes, *&c.* 4ly, By acting or changing nothing at all, except what is evidently known to be done from a clear *Indication.*

But thoſe Specificks, which remove the Cauſe of a Diſeaſe by ſimply applying them as ſuch, gain the Appellations of miſchievous Poiſons themſelves, as well as thoſe of noble Medicines, as the *Peruvian Bark* in the Cure of an intermitting Fever, *Opium* of Pain and the like particular Antidotes that cure any particular Diſeaſe, by correcting, attracting or expelling the Malignity.

A healing Indication in the Diſeaſes of a ſolid Part.

IF the Diſeaſe it ſelf lodges in a ſolid ſimilar Part, being known, it eaſily ſhows its own *Indications.*

For if it is united where a Solution or Diviſion is required to the Cure, firſt, by taking away the foreign or dead matter, placed in betwixt the ſeparate Parts. 2ly, The drawing them out mutually to their natural Situation. 3ly, Giving Reſt, and not interrupting or diſturbing their Co-alition. 4ly, Keeping them in a natural Moiſtneſs, Heat, and Softneſs. 5ly, A Conglutination that is render'd natural by means of a moderate, ſound, liquid Nutrition.

The Three firſt are effected by the Hand of the *Chyrurgeon*, the Fourth by Balſams, Oils and Unguents, that prevent Putrefaction, Balſams of Tolu, Peru, Copayva, Mecha, native Turpentine, Butter, Marrow, *Arcæus*'s Balſam, Ointment of Baſilicon, Oil of Olive Linſeed, *&c.* likewiſe Herbs and Flowers infus'd in Oils, *&c.* as St. *John*'s Wort, Vervain, Marſh-mallows, Agrimony, white Lillies, *&c.* The Fifth is perform'd by preſcribing a requiſite or proper Diet to the Sick.

Too great Rigidity or Stiffneſs of the ſolid Parts indicates, there ought to be a Relaxation of them, which is obtain'd, firſt, from Fomentations, Baths, Liquors, Injections and Vapours of warm Water. 2ly, By the ſame means applying a gentle Decoction of emollient Vegetables, of Mallows and Marſh-mallows, Vervain, Acanthus, Pellitory of the Wall, Mercury, Fenugreck, Linſeed and Quinces, Wheat and Oats. 3ly, Applying of ſoft Oils after the ſame manner. 4ly, By moderate Motion or Exerciſe frequently uſed.

Too great Weakneſs or Relaxation of the ſolid Parts being known, indicates or requires the ſtrengthning of them which is to be obtain'd, firſt, by *Cardiacks* as have been already deſcrib'd. 2ly, From greater Motion than ordinary, apply'd to the Body by Frictions and Exerciſe, that a little more Hardneſs and Calloſity may be gain'd to the Part. 3ly, From a dry Heat. 4ly, From the like Diet and Air.

From which it is plain, what ought to be done in an Encreaſe or Diminution of Elaſticity; in too great Weakneſs of a Fibre, or too great a Contraction or Diſtraction.

A healing Indication in Diſeaſes, that corrects the Fluids.

THE Humours that are obſerved or taken notice of to be vicious in a Diſeaſe, *indicate* either the Alteration or Evacuation of them; and that either in the whole or in one affected Part.

A Vice or Depravity of the Fluid lodging in one particular Part, always ſhows either the Tenacity or Roughneſs of the Liquid, or elſe the ill State and Condition of the Solid, and therefore *indicates* the Change of the Paſſage as well as the Matter.

Matter that is lock'd up in a Place that hath too little Motion and is impaſſable, is reſtored, firſt, by diluting warm aqueous things, under the Form of Drink, Fomentation, Vapour, Bath or Injection, but ſo apply'd, that they may be able to remove the Obſtruction in the neareſt Part they can be to the affected Place. 2ly, By reſolving ſaline Medicines in like manner adminiſtred; as Nitre, *Sal prunelle*, *Sal Polycreſte*; Nitre ſtibiated, *Sal Gem*, Salt Armoniack, Flowers of the ſame, with a fix'd Alcaline Salt, Borax, the Salts of Vegetables, volatile Alcalies, ſoluble Tartar, *&c.* 3ly, By *Sapo's* from expreſs'd Oils and fix'd Alcalies from expreſs'd Oils and volatile Alcalies; from diſtill'd Oils and fixed Alcalies; the Galls of Animals and the Juices of the abſterſive Plants; as Lettice, Succory, Dandelion, Sow-thiſtle, Goats-beard, Taragon, Endive. 4ly, By thoſe which are contrary to, and prevent any particular Coagulation, as by the Uſe of Alcalies when there is a *Coagulum* made by Acids, and in a glutinous Coagulation, from the Uſe of *Sapo's*: In a *Coagulum* from Reſt, by the Uſe of Salts and Soaps. 5ly, By Cardiacks, ſaline, aromatick, oily ſpirituous things conſidered as ſtimulating Medicines.

An obſtructed Courſe is made pervious, firſt, By opening the Paſſages with Drink, Waſhing and Bathing of warm medicinal Waters, with emollient and ſaline temperate Medicines, moderate, dry, moiſt or hot Friction or Rubbing of the Parts. 2ly, The ſame is made from the broken matter, together with the filled Veſſels, by warming, ſoftening, and moving, as Putrefaction and Suppuration, and the Reſolution of the whole Part affected into a Fluid, *Pus* or Corruption. This is done by the Meal or Flour of Oats, Linſeed, Wheat, Pea's, Beans, Lentils, Fenugreck, *&c.* as alſo the emollient Roots of Mallows, Marſh-mallows, Vervain, Melilot, Leaves of *Mercury*, or wild Spinage, Pellitory and Figs; the Yolks of Eggs, aromatick acrid Gums, *Ammoniacum*, *Galbanum*, *Opopanax*, *Sagapenum*, freſh Butter, which are either form'd into *Pultiſes*, *Ointments* and *Emplaiſters*. 3ly, By opening the way for the matter thus prepared; by Section or Cutting with an Inciſion-knife, or the Application of a *Cauſtick*.

The Vices of the Humours, offending in the whole Maſs, firſt, according to the *ſemeiotical* Doctrine indicate the contrary Remedies; to wit, too much Fluidity requires Inſpiſſating or Thickneſs, which is acquired, firſt, by a Diet prepared from the Gelly of Animals and Vegetables. 2ly, From a farine aqueous Drink that is not fermented, as Barley, Water, *&c.* 3ly, By Encreaſing the Action of the *Viſcera* by thoſe things fore-admoniſhed for that purpoſe. 4ly, By the proper Uſe of *Cardiacks*.

The Thickneſs of the Fluid, if it offends, requires Attenuation or Thinneſs, and this is procured, firſt, by Diet from Meats that are chiefly fluid and light, the Broth of Fleſh boil'd with Garden Pot-herbs that are moderately attenuating, as Endive, Succory, Sallery, Cabbage. 2ly, From acrid warm Pickles, as Muſtard, Creſſes, Colewort, Water-creſſes, Naſturtium, Horſe-radiſh, with Pepper, Leeks, Garlick and Onions. 3ly, From old, ſharp, ſpirituous Malt Drink, Wine, Hydromel, Brandy, *&c.* 4ly, By diluting Drinks, Baths, Injections and other aſſiſtance of Water and Heat, or the Motion of Running, Exerciſe, Rubbing, Riding, Walking, *&c.* 5ly, By ſtrong ſtimulating Sudorificks, Diureticks, Purging, Vomiting, Bliſtering, Mercurials, *&c.* 6ly, By forceable Reſolvents, as the fix'd Alcalies, volatile lixiviate Salts, and thoſe things which are compounded from them.

But too much Motion of the Humours circulated thro' the Veſſels, in ſecerning or excerning the Fluids, indicates a Reſt or Quiet which is procured, firſt, by removing that particular *Stimulum* which irritates the Fibres and raiſes that Motion, or elſe from correcting its contraries. 2ly, By leſſening the whole Maſs of Fluids. 3ly, By inducing Reſt from *Opiates* and *Anodynes.*

The ſame Motion being too much abated, wants raiſing to a greater Force, which may be done, firſt, by removing the Obſtacle or Impediment, by correcting aud aſſiſting Remedies. 2ly, By the Help of Attenuating and Cardiack Medicines.

The Acrimony of the Humours in general, alſo *indicate* in general the Reduction of the Acrimony to be more ſluggiſh and unactive; and this is effected, firſt, from a conſtant Diet of thoſe Aliments, that are almoſt taſteleſs and inſipid, perfect Gelly, ſoft and oily, as Milk, Bread, *&c.* the Broth or Gelly of freſh young Fleſh, made by Boiling and Expreſſion freſh Fiſh and Fleſh; wheaten Bread well fermented and fully baked, good new Almonds,

Piſtachio

Piſtachia and *Cocao* Nuts, with the Milk of the latter, ſweet Summer Fruits that are perfectly ripe. 2ly, By drinking of pure Water. 3ly, Reſt and Eaſe of Body and Mind. 4ly, By diluting, watry, ſoft, mealy, emollient oily things made into *Ptiſans, Emulſions, Fomentations, Baths, Drinks, Clyſters, Injections.* 5ly, By *Opiates* and *Anodynes.*

But the acid Acrimony requires its Correctives, ſuch as are, firſt, Diet from Eggs, Fleſh-meat, Fiſh, together with Pickles, determining the Humours to become Alcaliſate. 2ly, Water-drinks or oily fat Liquors, as Brunſwick Mum, Malaga, Canary and Spaniſh Wines, good old Metheglin, *&c.* 3ly, Chiefly Reſt, as long as there is any great Sourneſs prevails, afterwards an Encreaſe of Motion by degrees, and at laſt pretty ſtrong, together with Chearfulneſs of Mind. 4ly, Such Medicines as abſorb the Acid, as Crabs Eyes and Claws, the Bones of Fiſhes, *&c.* Shells, Pearl, Coral, Chalk; fat Earths, as Bole, Lemnian and ſeal'd Earth, *Lapis Hæmatitis*, Dragons Blood, Filings of Iron, *&c.* or ſuch as convert the Acid into a compound, ſoft, permeable Salt, as the volatile, fixed, lixiviate Salts; likewiſe thoſe that blunt the Points of the Acids, as ſoft oily Emollients.

Again, the alcaline Acrimony being diſcover'd, requires, firſt, a Diet from the Milk of Animals fed with tender Herbs, the Whey and Butter-milk from the ſame, as alſo Summer Fruits. 2ly, Drink from Water or ſmall Beer. 3ly, Reſt and moderate Cold. 4ly, Medicines, which by deſtroying the Alcali, convert that into a ſoft, compound or neutral Salt, as are almoſt all the natural Acids, the acid *Serum* or Whey of Milk from Animals, *Churn-milk*, Cream, *&c.* ſo thoſe from Vegetables, as Sorrel, Wood-ſorrel, Cherries, Raſps, Berberries, Currans, the Juice of Oranges and Limons, Rheniſh and Moſelle Wines, Vinegar, Tartar and the Cream of Tartar, Tamarinds,

rinds, Acacia, *&c.* thoſe from Foſſils, as Sulphur, Vitriol, Salt, Nitre either ſimple or mix'd with other Bodies.

A *muriatic Acrimony* indicates, firſt, a Diet perfectly taſteleſs or inſipid. 2ly, A ſpirituous, light, watry Drink that is a little acid. 3ly, Medicaments that are emollient, farinous, diluting and alſo lixivious, made from quick Lime. 4ly, Thoſe generally which are oppoſite to Acrids.

An oleous, aromatick, bilious, putrid, rancid Acrimony ſtands in need, firſt, of a Diet, from the inſipid, taſteleſs, farinous, olerant, acid Fruits, with Meats that are very gentle *Acidulæ.* 2ly, Drink from Water and the moſt diluting *Oxymel*, or a Decoction of Fruits. 3ly, Reſt and moderate Cold. 4ly, Medicines from Lixiviates that are gently warming, as Honey, Manna, Caſſia, Sugar, the freſh Juices preſs'd or ſqueez'd from Summer Fruits. 5ly, Things that are generally contrary to *Acrids.*

Whoever underſtands aright the Fundamentals here laid down in this method of Healing, and hath likewiſe weigh'd and conſider'd well the Works of *Hippocrates* and *Galen* thereon, may perfectly underſtand the Medicines that are requiſite to raiſe, promote, govern and abſolve a Digeſtion and *Criſis* both in acute and chronick Diſeaſes.

For theſe conſiſt only in the Attenuation of the thick, the temperating the acrid, in opening of the obſtructed Paſſages, in ſtrengthening the weaker lax Parts, and relaxing the ſtrong and rigid, as alſo in the Temperature and Regulation of Motion; that the Conſent and Opinions of the Antients may yet plainly exiſt.

For from them we ſee what hath been the Boaſts in every Age, and eſpecially from the Principals of the Chymiſts, if theſe *Axioms* are firſt diligently conſider'd from the *Panacea.*

1. A *Panacea* acts not or performs its Virtue on a *Cadaver.*

But 2. requires the Motion of remaining Life, that it may be ſtirr'd up to the Exerciſe of its Power.

3. Alſo it acts not upon a Part of the Body perfectly dead, yet cohering to the whole, whether it be turn'd into *Pus, Ichor* or a *Sphacelus.*

4. But the Extenſion of its Power or Virtue terminates in Life.

5. It reſtores not by it ſelf the vital Liquids that are loſt or deſtroy'd.

6. Neither the ſame being corrupted, does it reduce to a Natural Diſpoſition, as for example, *Pus,* Corruption, a ſtinking Sanies, or the Matter of a *Cancer.*

7. It reſtores not the ſolid Parts that are cut off, wither'd or conſumed, either of Veſſels, *Viſcera* or Limbs.

8. Many and thoſe various Diſeaſes, may ariſe from one and the ſame ſimple, material, efficient Cauſe, if that is apply'd various ways to different Parts of the Body.

9. There may indeed only from the Motion of the Animal Spirits varied or diverſified, many Diſeaſes ariſe, and be maintain'd, and increaſe.

10. As from Obſtructions only many proceed while Life remains.

11. Laſtly, from Spaſms or Contractions ſingly, Wind, ſmall Prickings and Poiſons.

He that weighs all theſe things truly, will clearly and evidently ſee, that there are many Diſeaſes relieved or cured by one Medicine, but that no Medicine cures all Diſeaſes.

But the Remedies hitherto obſerved to be moſt univerſal, are *Water, Fire, Quick-ſilver, Opium.*

And practiſing upon theſe chiefly, tho' endeavoring cautiouſly to hide 'em, ſome have gain'd a great Name to themſelves, who were vulgarly believed to poſſeſs or be Maſters of an univerſal Medicine.

From hence again, it is plain what are call'd corrective Medicines in Diſeaſes, and whether there are any univerſal ones.

A healing Indication evacuating from the Fluids.

THE Matter of a Diſeaſe, or that which to its Aſſiſtance Art indicates muſt be carry'd off, is to be evacuated by a double Paſſage. Firſt, By natural Emunctories and Spiracles of the whole outward Skin of the Noſtrils, Mouth, Jaws, Oeſophagus, Ventricle, Inteſtines, Bladder and Urethra. 2ly, By artificial means, by *Phlebotomy* in the Blood Veſſels, *Arteriotomy* or the cutting of an Artery, Scarifications, Leeches; by Cauſticks and Bliſtering in the *Lymphaticks*, and in all together, by Iſſues, Setons, Ulcers and Fiſtula's.

Hence the firſt Diſtinction of Evacuations, is taken from the diverſity of the Emunctory, by which they educe the morbid Matter, but the other from the difference of Matter which is carry'd off by ſome particular Parts.

Sudorificks.

FIrſt of all therefore Sweat and the Matter of Perſpiration is drawn out from the Body thro' the Skin; the Medicines which throw it out chiefly, are *Hydragoges* or *Sudorificks*; thoſe which educe it in the ſecond place are call'd *Diaphoreticks*, of which there is no great difference, but only in the degree of Action, ſuch are all thoſe things which move ſtrongly throughout the whole Body. 2ly, Thoſe which in the interim likewiſe leſſen the Reſiſtance in the exhaling Veſſels about the Skin.

The firſt is brought about chiefly by drinking plentifully of warm Water. 2ly, Of fermenting Acids, or the diſtill'd Spirits of Vegetables, or the moſt attenuated reiterated Diſtillations of ſubtil Foſſils; eſpecially if theſe are drunk mix'd with warm Water. 3ly, With volatile and fix'd Alcalies, diluted with warm Water. 4ly, With all compound Salts diſſolv'd in Water, to which we refer to *Sapo*'s; alſo Cryſtals from metallick Bodies, or Salts joyn'd to them, or thoſe metallick Parts that are much attenuated, and not too acrid, as *Antimony Diaphoretick*, *Tachenius*'s fix'd *Sulphur* of *Antimony*, *Bezoardic Mineral*, *Mercury Diaphoretick*, *Crollius*'s *Diaphoretick Gold*, *Cinnabar* and many others of the like nature, which upon Examination are found either not to act at all, and then are call'd Diaphoretick, or elſe operate from a ſaline Acrimony lodging in them, and ſo often promote Sweating. 5ly, From *Aromaticks* endowed with an acrid ſubtil Acrimony, as are particularly Wormwood, Southernwood, Smallage, Aſparagus, Aniſe, Angelica, Aſarum long boil'd, Ariſtolochia, Gum Ammoniacum, Burdock, Water-creſs, Betony, Carduus Benedictus, Calamint, Avens, Carni, Clove-gilliflowers, Cantaury the leſs, Cinnamon, Saffron, Camomil, Maiden Hair, China Root, Dittany of *Crete*, Liverwort, Agrimony, Muſtard, Galingal, Gentian, Hyſſop, Bays, Lovage, Horehound, Motherwort, Balm, Mint, Naſturtium, Origanum, Leeks, Pennyroyal, Roſemary, Rue, Savine, Sage, Sanicle, Sarſaparilla, Saſſafras, Scabious, Scolopendria, Scordium, Thyme, Tanſy, *Paul*'s Betony golden Rod, Nettle, Zedoary, and the Compounds made from hence; as Treacle, Diateſſeron, Mithridate, Diaſcordium, Orvietan, and many others of the like kind.

But the other part of Sweating is perform'd by a neat waſhing or cleaning of the Skin, by Vapours, Lotions, Baths, Frictions. 2ly, From a Relaxation or Looſening of all the cutaneous and ſubcutaneous Veſſels, which is happily perform'd by a Steam or Vapour of hot Water, apply'd to all the Skin of the Body but that of the Head. 3ly, By increaſing of external Heat about the naked Body from the Warmth of a Bed, a vaporous Bath, burning Spirits, *&c.* By theſe means, inſenſible Perſpiration, call'd a *Diaphoreſis*, is gently promoted.

The Body is prepared for more eaſy and ready Exerciſe, and Labour if required, firſt, by Attenuation, and diluting the Humours. 2ly, From relaxing and opening the Veſſels.

Sweat and a *Diaphoreſis* are indicated in Diſeaſes, firſt, from the Preſence of the critical Sweat beginning to eaſe or relieve the Diſeaſe.

2ly, From the Thinneſs of the morbid Matter diſperſing, or ſpreading it ſelf thro' all the Veſſels, as in the Plague, the venomous Bite of a Dog, *&c.* or the moſt ſubtil Caſe of the Venereal Diſeaſe, not yet fixed.

3ly, From the particular Temperament of the Sick.

4ly, From the known Epidemick Conſtitution.

5ly, From various Obſtructions, that lodge every where throughout the Body being reſolv'd or looſen'd, eſpecially in the ſubcutaneous Diſeaſes, as *Scab*, *Leproſy* and *Venereal Ulcers*.

Apophlegmaticks or ſuch things as purge Flegm from the Head, Noſtrils, Mouth, &c.

ALL the Parts of the pituitary Membrane of *Schneider*, evacuate themſelves into the Noſtrils, and being diſtributed into various or different Cavities, ſecern a *Mucus*, falſly taken for the Pituite of the Brain; this and the humid Matter of the Eyes as well natural as lachrymous; as alſo the liquid Matter in the *Coryza* or ſtuffing of the Noſe, being thicker in a *pituitous Catarrh*; and therefore this great quantity of Humours or Rheum may be diſcharg'd as well the by Strength of Nature as by Medicaments.

This Evacuation is indicated, firſt, from a Heavineſs or Stoppage in the Head, a *Coryza*, Catarrh and Sneezing, while a *Pus* or Rheumatick Flegm drops thro' the Noſtrils, with lachrymous or weeping Diſorders of the Eyes.

2ly, From the Temperament of the Sick, finding great Relief from the like Evacuation.

3ly, From a Revulſion made from the Lungs, in the Catarrh, Peripneumonia, Phthiſick and Stoppage of the Lungs.

This Evacuation is raiſed from a *Fotus*, *Vapour*, or a Decoction ſnuff'd up the Noſtrils, firſt, of warm Water long boil'd with Emollients in them. 2ly, Of the ſame render'd a little more acrid with Honey or Sugar. 3ly, From a Decoction of Betony, Lavender, Marjoram, Roſemary and Rue. 4ly, From theſe very Herbs roul'd up when green and ſtuff'd up the Noſtrils. 5ly, From every acrid *Stimulum*, as *Sal Armoniac*, Powder of *Tobacco*, *Hellebore* or *Euphorbium*; theſe are *Errhines* or *Ptarmick Medicines.*

This Diſcharge is ſtopt if too great, eſpecially if a ſtrong Sneezing and an acrid Running at the Noſe attend, firſt, with warm new Milk, in which Mallows are infus'd, ſnuff up the Noſtrils.

2ly, By ſoft, gentle Fumigations of *Benjamin*, Maſtick, Olibanum, Amber, Frankincenſe; or the milder Aromaticks, as Marjoram, Marum, and Pennyroyal.

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℞ Cinnam Zedoar Asari
Sem Cardamom Croci ana
Cochineal ℈i Aloes ʒiv —

Species Hierae

℞ Cinnam, Zedoar, Asari
Cardam, Croci ana ʒi
Cochineal ʒi & Aloes ʒij —

ye third Edition
Hy a Daventer's Art of Midwifry improv
Printed for J Pemberton at ye golden Bu
against St Dunstan's Church Fleet St

Beſides if this Evacuation be too much uſed, it brings a pernicious Cuſtom upon the Humours and the Parts.

But ſince the Noſtrils evacuate or diſcharge themſelves thro' the Mouth, and in that are the ſalivatory Ducts, the *Tonſillæ* and the Membrane of *Schneider*, the Indication firſt of all is to make Proviſion by Medicine, ſuch as are *Apophlegmaticks* and *Gargariſms.*

Sialogogs or Medicines promoting Salivation.

A Large and artificial Salivation is *indicated,* firſt, from ſuch a *Criſis.*

2ly, From the particular Nature of the Diſeaſe lodging chiefly in the Glands and the adipous Membranes, but eſpecially in the Cure of the *Venereal Diſeaſe.*

3ly, From the Nature of an Epidemick or Univerſal Diſeaſe.

The Body is prepared by a large, ſometimes continued Uſe of the attenuating, diluting, gentle, warm Decoctions of *Scabious, Pellitory, Burdock, China, Sarſaparilla, Saſſafras* and *Sanders.*

The Evacuation is rais'd or promoted, firſt, by waſhing or gargling the Mouth.

2ly, By a gentle and continual Maſtication or Chewing of any tenacious or tough Subſtance, as Maſtick, Wax, Myrrh, eſpecially if any Acrids are mix'd with thoſe, as *Pellitory* of the Wall, the *Leucanthemum* of the *Canaries* taſting like *Pellitory, Ginger* and *Pepper.*

3ly, By drawing into the Mouth acrid and irritating Fumes, as *Tobacco, Sage, Roſemary, Marjoram, Mother of Thyme,* &c.

4ly, But chiefly and moſt egregiouſly from the Uſe or Action of Medicaments, which create a light but continued Loathing, as the taking of a little *Antimony* that is not much emetick, and common *Vitriol.*

5ly, By thoſe things which plainly flux all the Parts of the Blood, change 'em into *Lympha,* and ſo convert all into a *Ptyaliſmus* or Spitting; as crude Quick-ſilver, Cinnabar, a Solution of *Mercury* in *Aqua fortis,* white and red Precipitate, Turbith Mineral, *Mercury* ſublimate, diſſolved, *&c.* But the firſt of theſe together with warm bathing or rubbing of the Head, Neck, Shoulders and Face promotes that Action.

Too great a Salivation is abated or ſtopt, or at leaſt mollified, firſt, by a large conſtant Uſe of the ſofteſt warm Drinks, as Decoctions of Mallows, and Liquorice in Milk and Water.

2ly, By allaying the *Impetus* or Violence of it with ſoft, oily anodine Emulſions, adding prudently a little *Diacodium* or *Opium.*

3ly, By revulſing it into other parts by ſome ſtrong Evacuation, eſpecially *Hydragoges* that purge by Stool. Yet where there is need of the greateſt Conduct, leſt the Violence of the Motion of this Matter that is always acrid, ſhould ruſh into other parts with more Danger; wherefore he that divides it beſt, can command it with greateſt Safety.

Of Emeticks or Vomits.

VOmits are indicated, firſt, from the Stench of the Mouth in a moving, from a certain Bitterneſs like Gall in the Throat, Ructation, Loathing and Gnawing of the Stomach, with the Appetite falling off by degrees without any Fever attending or viſible Cauſe.

2ly, From a ſpontaneous or natural Vomiting, together with great Eaſineſs therein, 3ly, From the Nature of the known matter, whether agile or at Reſt.

4ly, From the Place affected with Repletion and Obſtruction beneath the *Diaphragm*, eſpecially if that Affection be primary and nothing oppoſes it.

5ly, From the General or Epidemick Nature of the Diſeaſe.

6ly, From the Conſtitution or Temperament of the Year.

Vomits are prohibited from the contraries of theſe, and the Body of the Patient is prepared for a more eaſy and ſafe Vomit, firſt, by returning the moveable matter by Dilution, Attenuation and Reſolving.

2ly, By relaxing and lubricating the Paſſages by emollient, oily ſoft things.

3ly, Firſt by letting Blood, if the Body is too *plethorick*, or too vigorous and ſtrongly agitated.

Vomiting is excited, firſt, by irritating the Spirits, from ſome conceived *Idea* that produces the greateſt Loathing; or from ſome unaccuſtom'd or unuſual Motion, as at Sea, *&c.*

2ly, By irritating the Fibres of the *Throat* and *Pharynx* with a Feather dipt in Oil, or ſomething of the like nature.

3ly, From drinking great quantities of hot Water with Oil, Sugar, Honey or the like.

4ly, From any ſtrong and viſcid Acrid; as Flowers and Seeds of Dill, *Aſarabacca* Leaves, or from the more violent ones of *Cataputia*, *Spurge*, *Cyclamen*, the Flower, Juice and Rind of Elder, Flower and Seed of Broom, both the Hellebores, Seeds of *Naſturtium*, *Ricinus*, &c. Bryony Roots, Orrice and Tithymal with Leaves of *Tobacco.*

5ly, From the Crocus, Glaſs and Flowers of *Antimony*, the Regulus, Subſtance and Infuſion thereof, or the Emetick Wine, *Mercurius Vitæ*, *Tartar Emetick* and the like, which perform various Effects according to their various degrees of Strength.

6ly, From *Mercury* made acrid by Acids, in which alſo they are variouſly diſtinguiſh'd, as they more or leſs abound with acid or cauſtick Salts.

The choice Doſe and Form of theſe are indicated from the Age, Sex, Temperament, Seaſon of the Year, *Idea* of the Diſeaſe and the Matter to be diſcharg'd.

It is promoted from plenty of warm ſoft Liquors, or Decoction of *Carduus Sage*, &c. drunk in quantities and repeated after every Paroxyſm or Fit of Vomiting, and is ſtopt with a Draught of freſh Oil, Aromaticks, Opiates, grateful Acids, ſtomachick ſtrengthening and corroborating things internally or externally apply'd.

Of Purgatives.

MAny things can be evacuated into the Inteſtines, and therefore by this way there may be carry'd out of the Body, *Saliva,Mucus*, or Flegm out of the Mouth, Jaws, Gullet, Stomach, both the Biles, the *Pancreatick Lympha*, the diluted or mucous Humour of the Guts, the black biliary Matter of the Blood, *Viſcera* and *Hypochondria*, the ſerous Matter of the Blood as well as the purulent from ſome critical, Symptomatick or morbid Abſceſs.

This Evacuation is indicated, firſt, from a Flux of the *Alvus* that is not colliquative.

2ly, From the offending Matter and the Place thereof.

3ly, From a repleted or obſtructed Part under the *Diaphragm*.

4ly, From the particular, general or Epidemick Nature of the Diſeaſe.

5ly, From Revulſion.

6ly, From the Signs of Digeſtion.

7ly, From the State or Condition of the Patient.

Purging is forbid or prohibited from the contraries, the matter to be moved is prepared, if there is occaſion, from the ſame thing as the Vomit was.

It is raiſed, firſt, from things that dilute and gently ſtimulate, drank in great Plenty, when the Body is empty or faſting, in moderate Weather, the Waters call'd Mineral, whether *Steel*, *Sulphur* or *Salt*, are ſuch, Whey, the ripe and freſh expreſs'd Juice of Summer Fruits.

2ly, From lubricating things, and alſo ſuch as ſtimulate by an eaſy Acrimony; ſoft, freſh, expreſs'd Oils, fat Broths, emollient Decoctions, or the Extracts of them, Sugar, Honey, Caſſia, Manna, Turpentine, Damask Roſes, Gum Ammoniacum, Galbanum, Myrrh, Oppopanax, Sagapenum, taken in a moderate Doſe.

3ly, From gentle Acrids, and alſo that are a little groſs, therefore act chiefly in the firſt Paſſages, as Prunes, freſh Figs, Currans, Tamarinds, Myrobalans, Tartar, Rhubarb, Aloes, Polypody, *Mercurius dulcis*, &c.

4ly, From *Acrids*; as Aſarabacca, Carthamum Seeds, Agarick, Mechoacan, Julep, Turpeth, Hermodactils, Sena, Soldanella, Dwarf Elder, Scammony, Diagridium, Peach Flowers.

5ly, From the moſt *acrid* or *cauſtick*; as black and white Hellebore, Gamboge, Spurge, Elaterium, Lapis Lazuli, Euphorbium, Mezereon, white, red, yellow and green Precipitate from Mercury.

From this almoſt innumerable variety of Compounds are form'd into Pills, Electuaries, medicinal Wines, Draughts, *&c*,

The Choice, Doſe, Form, Preparation of which, are indicated, as hath been ſaid before of *Vomits*, from the Nature of the matter to be diſcharg'd; from whence they take various Appellations, as ἐκκοπεϱτικά, Purges are either *laxative* or ſuch as are looſening, *Cholagoge,* that purge Choler, *Phlegmagoge,* Flegm, *Hydragoge,* Water, *Melanogoge,* Melancholy, *Pauchymagoge,* or an univerſal Purger of all the Humour.

This Evacuation is promoted, by Salt, fat Broths, new Whey and the like ; but is ſtopt by ſoft, oily, acid, aſtringent, opiate, ſpirituous Medicines, or elſe by Revulſion into ſome other Parts.

The Evacuation made of the Fæces by Clyſters, indicate theſe things.

Firſt, From the place affected.

2ly, The matter to be educed.

3ly, From the Strength of the Patient and his Temperament, and likewiſe from the urgent neceſſity of the Evacuation.

4ly, From Dryneſs, Heat, and too great Motion of the Humours in acute Caſes.

5ly, From reconciling the Revulſion and the Refreſhment, requiſite in the Fibres and in the acrid Humours.

Therefore *Clyſters* are various, firſt, being only to dilute the Parts from Water, Whey, or ſweet Drink.

2ly, They are emollient and lenitive from fat Broths, Oils, Decoctions of the emollient Herbs, Milk, Sugar, Soap, Syrups, *&c.*

3ly, The lighter ſtimulating Medicines, Salt Nitrous Water, Decoctions of the more gentle Purgatives, and Urine.

4ly, Acrid ones from Decoctions of the ſharpeſt Purgatives.

5ly, The moſt certain Clyſter, from the injected Fume or Smoke of Tobacco.

Laſtly, There are *Suppoſitaries,* which are made of acrid, ſtimulating things ; Honey boil'd to a Thickneſs, Sugar, Soap, *&c.* which may be compounded with the more acrid and cathartick Remedies, as neceſſity or occaſion urges.

Of Diureticks.

AN Evacuation or Diſcharge by the Urinary Paſſages is indicated, firſt, from Signs of Digeſtion.

2ly, From a critical Flux of the morbid matter by the Kidneys.

3ly, From a peccant Saline, lixiviate, ſubtil earthy, ſcorbutick, purulent matter.

4ly, From the Place affected.

5ly, From the Epidemick Conſtitution.

6ly, From the Temperament of the Patient accuſtomed to this kind of Evacuation.

It is prohibited from the contraries, and is excited by the uſe, firſt, of great quantities of Water or watry things.

2ly, Of alcaline, fixed, volatile, ſimple or compound Salts.

3ly, From fix'd, neutral, compound Salts, as Sea Salt, Sal Gem, Nitre, Borax, Alum, Tartar, or tenaceous Powders, mix'd with the *Acid* in our Bodies; ſo likewiſe the Liquor of *Cockles* and *Oyſters.*

4ly, From the ſour animal Humour, Whey, and Butter-milk.

5ly, From the vegetable Fruits of Oranges, Limons, Raſps, Cherries, and the thin *Moſelle* and *Rheniſh Wines.*

6ly, From the *acid Spirits* of Vinegar, Nitre, Salt, Sulphur, Alum, Vitriol, either ſimple or compounded.

7ly, From vegetable Roots of Smallege, Aſparagus, Carrot, Eryngo, Onion, Parſley, Fennel, Butcher's Broom and Saxifrage, the Fruits of the bitter Almond, and the Peach and Apricock Stone; or laſtly, certain Compounds prepared from ſome or all of theſe.

Diureticks are aſſiſted by an empty Stomach, an eaſy Digeſtion, gentle Motion of the Body, cold Air, provided there be warmth in the mean time in the *Loins*, *Hypogaſtrium*, Pubes and *Perinæum*.

Evacuation of Urine is ſtop'd or allay'd by the uſe of mucilaginous, ſoft Emulſions.

2ly, Aſtringent and corroborating Medicines.

3ly, By Opiates.

4ly, From a Determination into other Places, but eſpecially from *Sweat*, rais'd and continued ſometimes by Motion or Sudorificks.

Menagogicks or Evacuations of the Menſtrua.

AN *Evacuation* of *Menſtrual Blood*, or in *Child-bearing*, is indicated, firſt, from Age.

2ly, From a *Plethora*.

3ly, From whatever Diſeaſe is derived from it, and its Symptoms; as firſt, in *Child-bearing*.

It is exercis'd or perform'd, firſt, by determining at the Womb, with Fomentations and Baths of Feet and Legs, *Frictions* often us'd on the *Feet*, *Legs*, *Thighs*, *Hips*; by *Cupping Glaſſes* apply'd to all thoſe and often repeated; by letting of Blood in the Veins of the Feet; by Emplaſters of the fætid Gums laid to the Navel, Thighs and Legs, *&c.*

2ly, By opening the uterine Parts and Veſſels by Baths, Vapours, Fomentations and Injections, and the Application of Internals, as *Birthwort*, *Motherwort*, Calamint, Cardiaca, Dittany, Lovage, Marjoram, white Horehound, Mint, Penny-royal, Roſemary, Rue, Savine, Tanſey, the fætid Gums, Aloes, Myrrh, Saffron, Borax, Steel, Amber, volatile, alcaly Salts, diſtill'd, aromatick Oils, *&c.*

3ly, By *Chirurgick*, *Dietetick*, and *Pharmaceutick* Remedies, which are oppoſite to the particular Impediment of Evacuation, which are only to be found in proper ſingle Signs in every *Species*.

The *Evacuation* is to be ſtopt, if it hath exceeded.

Firſt, By Revulſion.

2ly, By Conſtriction or binding of the Veſſels.

3ly, By Opiates.

Of Phlebotomy.

THE letting of Blood within ſuch a Compaſs, as not to impair the Strength, firſt, leſſens the quantity of the Arterial and Venous Fluid.

2ly, It makes the Reſiſtance of what is moved, leſs.

3ly, And conſequently a Fullneſs of the Veſſels, ſo that they mutually compreſs each other.

4ly, Hence from the diſtended Veſſels, the Contraction or Elaſticity is reſtored.

5ly, It rarefies the Fluids.

6ly, It renders them free.

7ly, It reſolves and looſens them.

8ly, It prevents Obſtructions.

9ly, Promotes the Circulation, Secretion and Excretion.

10ly, Abates the violence of the Blood's Motion.

11ly, Cools and allays.

Hence *Blood-letting* removes or takes away ſo many different Diſeaſes, yet produces wonderful Changes.

It is indicated, firſt, from too great Plenty.

2ly, From too great Reſiſtance given to the Heart by the Humours.

3ly, From a ſuffocating Motion by too much ſwelling, from a Quantity or Rarefaction rais'd in the Arteries.

4ly, From a ſuffocating Motion, beginning by too much Extenſion of the Veſſels, in which the very Elaſticity of them is deſtroy'd.

5ly, From the Blood being too denſe.

6ly, From the ſame uniting too cloſe.

7ly, Or thickning too much.

8ly, From thoſe things which are Signs of an inflammatory and great Obſtruction, found every where in the Body, being firſt diſcover'd by Pain, Swelling, Redneſs, Heat and Trouble, when at the ſame time *Sweat* and *Urine* are ſuppreſs'd.

9ly, From too great Motion of the Humours thro' the Veſſels, or contrarywiſe too ſlow a Motion.

10ly, From too great Heat throughout all the Veſſels.

11ly, From too great violence of the Blood, moved into any one particular Part; as in *Hemorrhages* and *Fluxes.*

12ly, From known Epidemick Cauſes.

13ly, From Age, Sex, Diet or Temperament.

14ly, From a *Cachochymia.*

15ly, From aſſiſting the Entrance of Medicines into the Veſſels, and alſo procuring a Mixture thereof, as likewiſe of exciting or ſtirring up the ſtrength and force of them in performing the greateſt Cures.

Blood-letting is the beſt, in cutting a large Orifice firſt.

2ly, In a free large Vein, eaſily diſcover'd, at a diſtance, from Nerves and Arteries.

3ly, In accelerating or quickning the Motion of the Blood, while it flows by a ſtrong Reſpiration.

4ly, By the Motion of the Muſcles about the Vein that is open'd.

5ly, From the Patient's lying.

Preparation is made for the eaſier Adminiſtration thereof, firſt, from *Friction* or rubbing the Part.

2ly, Fomentation.

It is prohibited in many Chronick Caſes, in which many Obſtructions and little fluid Blood remains in the Veſſels.

2ly, From Age.

3ly, From Temperament.

4ly, From the known Nature of the Epidemick or Endemick Diſeaſe.

5ly, From a *Criſis* now otherwiſe made.

6ly, From the ſmall quantity of red Blood, and the Weakneſs of the Body.

7ly, From a freſh Delivery of a Woman in Childbed.

From whence it appears of what Damage to Mankind this Remedy is, if it be either always or never to be adminiſtred, according to the Opinion of *Helmont* and others.

Blood to be taken from the *Hæmorrhoidal* Veſſels is *indicated.*

Firſt, From a melancholy Diſpoſition.

2ly, From Diſeaſes, wherein the Fancy or Imagination is affected.

3ly, From an uſual Flux of thoſe Veſſels, which are ſuppreſs'd.

4ly, From an Irruption of Blood by new ways which uſed formerly to be ſucceſsfully evacuated by the *Hæmorrhoidals.*

Blood is to be drawn, firſt, by mollifying the Veſſels with warm Fomentations of Water, Oil, Honey, the Emollients of the Clyſter kind, Vapours, *&c.*

2ly, By opening the Veins by Leeches, *&c.*

3ly, By the uſe of *Aloes.*

Scarifications act by ſtimulating and evacuating the Fluid, but *Setons* and *Fontanelle's* or Iſſues, by a ſlower Pain, ſtimulate and prick the *Genus Nervoſum,* diſcharging of *Serum,* and giving a vent to too great Fullneſs; hence it is plain, where, and when they are *indicated.*

Medicaments that are ſtimulating create Pain, Heat and Redneſs, from an united Motion in the Nerves, and act by a Determination into Places they are directed; from whence certainly they perform the moſt infinite, and thoſe often the moſt deſirable Effects.

Theſe are commonly underſtood, firſt, by ſtrong ſticking Plaiſters, which being apply'd to any Part, lodge there, till the Part affected reddens, ſmells and burns; ſuch as *Pitch, Bitumen, Caſtor, Vine Aſhes, Galbanum, Pepper, Pellitory* of the *Wall, Sal Armoniac.* 2ly, *Muſtard-ſeed* apply'd like Poultiſe, and left on till a red, hot, itching Tumour appears; ſo *Briony, Garlick, Naſtartium, Squills, Euphorbium* and *Crowfoot.* 3ly, *Bliſters* which are apply'd in the ſame Form as the former, produce violent Effects. 5ly, Potential Cauſticks, as lixiviate Salts, Lapis infernalis, ſublimate Mercury, *&c.* which raiſe Inflammations and *Eſchars*; laſtly, an actual Cantery of burning Iron.

A Palliative Cure.

BY mitigating the *Symptoms,* there is always ſomething taken away of the primary Diſeaſe; from curing all the *Symptoms* together, the Diſeaſe it ſelf is almoſt intirely cured.

But firſt of all, we are to conſider Thirſt, Pain, too much waking or want of Sleep, and the *Lipothymia,* or *Fainting* of the Spirits.

Thirſt, from a Dryneſs of the whole Body is quench'd or abated, by a large, frequent Draught of Water, Beer, or ſome grateful Decoctions mix'd with a little Acid, as Barley Water, Whey, Milk and Water, ſmall Punch, *&c.* thin Water-gruel, Chicken or Veal Broth without Fat; ſo likewiſe Baths. Fomentations and Clyſters, are uſeful.

Thirſt, from the Dryneſs of ſome particular Part, as the Mouth, Tongue, Throat, Gullet, is relieved, firſt, by the uſe of the foregoing things. 2ly, By waſhing and gargling often with the ſame. 3ly, By opening the Glands and Salivatory Paſſages by *Epithemums* and Fomentations, of laxative, moiſtning, and aperitive Remedies.

Thirſt, From a lixivious, acrid Salt, or from an aromatick acrid is cured by all theſe, eſpecially thoſe of the diluting kind, but chiefly if the *acid* and *nitrous* are mixed with them; from whence we may know how to appeaſe that which ariſes from a *muriatick Salt.*

But if Thirſt ariſes from an uncommon matter, as ſwimming, *&c.* it is to be removed by diluting and reſolvent means.

Pain is to be allay'd as a *Symptom* firſt, by diluting the *Acrid* which is done with warm Water, Water-gruel and the like, apply'd by way of Drink, Fotus, Clyſter or Bathing,

2ly, By looſening or relaxing the nervous Veſſels, by drinking, waſhing, bathing, or Injections of moiſtning, looſning Anodynes that are gently aperitive.

3ly, By correcting the *Acrid* it ſelf with proper Remedies.

4ly, By freeing or ſetting the obſtructed *Acrid* at Liberty, from the too great Preſſure of the Vital Humour.

5ly, By mollifying, digeſting and depurating the obſtructed *Acrid.*

6ly, By blunting the Senſes with a Numbneſs, by the internal Adminiſtration or external Application of *Narcoticks*; ſuch as are firſt of all the moſt gentle ones of the Flowers and Seeds of the *Corn Poppy*; Lettice, when full of Milk in the Summer time. 2ly, The ripe Heads of the Garden Poppy, gather'd before

fore the Seed is dry; the Milk that drops from the *European Poppy*. 3ly, The ſtronger Narcoticks of *Theban* and *Oriental Opium*. 4ly, The ſtrongeſt and moſt deadly kind, as *Mandrake*, *Nightſhade*, Water Hemlock, Stramonium, or prickly Apple, Henbane, Tobacco and the like; from all which are made external Applications, as Fomentations, Stoopes, Emplaſters, Cataplaſms, &c. internally, Waters, Tinctures, Syrups, Pills, Confects, Opiates, as *Diaſcordium*, *Venice Treacle*, *Mithridate*, *Orvietan* and many others.

Too much waking that ſeizes the Brain it ſelf, cauſes that great difficulty by which means they never go to reſt; except the Diſeaſe that firſt ſeiz'd the Head be removed, as is plain in a *Frenzy*, *Coma*, *Melancholy* and *Madneſs*.

If they proceed from too great Dryneſs, they are reliev'd by Diet Drinks, Baths and Injections, from emollient, laxative things, made uſe of for ſome time; of whick kind, Mallows, Marſh-mallows, Violets, Lettice and Succory are preferable.

If the *Symptoms* ariſe from any particular *Acrid*, they are taken away by the Cure of the *Acrid*.

But if it happens that the Humours are ſtrongly and too rapidly thrown into the Brain, the Cure is perform'd. By things that appeaſe or abate the *Symptoms*. 2ly, By Applications of *Fomentations*, *Baths*, *Bliſters*, &c. to the lower Parts; theſe are compos'd of Emollients and Acrids mix'd together; as Wheat, Barley or Oat-meal, Salt, Vinegar, Leeks, Garlick, &c. likewiſe Fiſh, and raw Fleſh of Beef, live Pidgeons and the like. 3ly, Repellers apply'd to the upper Parts more immediately affected, as Vinegar alone, or made with Elder, Roſes, Violets, &c. Oyntment of Populeon, the Anodyne Oils of Nightſhade, Violet, Poppy and Hembane.

Internal *Opiates* may be ſcarcely uſed in this Caſe, except the Diſeaſe proceeds from too great Motion of the Spirits, in which condition Regard muſt firſt be had to Evacuation and Dilution.

The Excretions being too large are ſtopt by thoſe things, which promote the Evacuations another way, in the Nature of *Revulſion.*

Too great an Excretion of Blood by the *Arteries* being wounded, or the larger Veins, is ſtopt by Compreſſion, binding, burning or ſearing up the Mouths of the Veſſels, inſpiſſating or thickning the Fluid, and the Contraction of the Solid; where Spirit of Wine, and ætherial Spirit of Turpentine is, be conſider'd in the firſt Place.

Lipothimia's or Faintings ariſing from the ſtagnant Humours, and from ſpaſmodick Pains are cured by diluting and relaxing; but if they proceed from the Vine of the torpid Spirits, then by ſtimulating Cardiacks: If from Evacuation they are cured by Repletion; if from *Hyſterick* Suffocation, then by fetid *Anti-hiſtericks.*

The Concluſion.

WE Have hitherto treated of almoſt all Sorts of Medicines, anſwering to all the ſeveral Cauſes of Diſeaſes, it remains now that we ſhew in what Order and Method they ſhould be applied to every Intention of Cure, but as Medicines in general, ſo the Foundation of Practice turns upon the Motion of the Blood, and the Diſpoſition of the Solids, which not only at all times defend the Body free from Corruption, and falling to decay, and ſo conſequently maintains Life, but alſo expells thoſe Cauſes that are Enemies to it, and the morbid Affections thereof.

Hence it was the Antients term'd Nature the beſt Phyſician, this Experience confirms, while the vulgar and thoſe who uſe Phyſick or Medicines without Art, only conſulting Nature free themſelves from many Diſeaſes; hence it comes that the common People have better Succeſs, from making uſe of the ſimple Decoctions and Infuſions of Herbs and Roots, than the labour'd Chymiſts with their vain, boaſted *Arcana's*, which frequently diſturb the *ſalutary* and *critical* Motions of Nature, rather than promote them.

The Inſtrument of every Diſeaſe is nothing but Motion, which is increas'd in the Syſtem of the Fibres, from whence Spaſms ariſe, or elſe in the Veſſels from whence the *Fluids* are driven ſwiftly thro' them, and procure *Fevers*, notwithſtanding nothing is a greater Enemy to Life, than the *Staſis* and Reſt of the *Fluids*, for this tends to Corruption, whereby the whole Body or a Part of it dies, therefore Reſt is diametrically oppoſite to Life; but by the increaſe of Motion the ſtagnant Humours are reſolved, and return to Motion, the Obſtructions are removed, and by the *Vital Circuit* in this Motion, driven thro' their proper *Emunctories.*

But at the ſame time we ought not to imagine, that there is any Knowledge or Conduct conceal'd in the moving Fibres, which points out the Seat of the morbifick Cauſe, and according to the degree or proportion of that, inſtitutes and appoints certain Times and Seaſons, and directs us to them; ſuch a Suppoſition is groundleſs and unneceſſary: But this human Machine is ſo artfully framed, that it is ſtirr'd up or excited to Motions and Actions of a different Nature, by means of its Fibres, which inſtrument of Motion is *ſyſtaltick*, from which afterwards according to the Laws of Mechaniſm, reſult various *Symptoms* and preternatural Affections throughout the whole Body.

Therefore in that the Wiſdom of the Creator is to be admired, that thoſe preternatural and morbid Motions produced from other Cauſes in the moving *Syſtem* of the Fibres, ſhould ſenſibly afford Relief and Help to the Body, defend it, and at the ſame time ſerve to expell the morbifick Cauſes; ſo that thoſe morbid Motions not really by themſelves, but by accident become *ſalutary*, and from a thing evil in it ſelf produce a good Effect.

But there are in the whole *Spaſms* and alſo *Fevers* of that Nature, that they perform a ſalutary Effect on the Body, while they remove and take away that which is offenſive and troubleſome to the Body, either in Quantity or Motion, too much Fluid, a *Staſis* contracted, and Putrefactions are dangerous to Life.

Now if the Blood be preternaturally increas'd, it excites or raiſes Contractions by diſtending and preſſing on the Fibres, or it increaſes the Tone and Motion of the Fibres, which is contractile and proper to the Fibres; from hence the Pores and Veſſels are clos'd and tyed up by the Contraction, the excluded Blood is driven forward with force to other Parts void of the Contraction, the Quantity of which afterwards, too much diſtending the Veſſels, breaks forth, and ſo the Blood is thrown out with great Relief to Nature.

Such an Evacuation of Blood is call'd *critical* and *healthful*, nor is it ſo without any reaſon, for it leſſens the quantity of Blood, which threatens the Body with a Diſeaſe, for this reaſon, the *Menſes* in Women, the *Hemorrhoids* in Men are counted *ſalutary*, and ought not to be impeded or ſtopt by the Phyſician.

When a Quantity of *Serum* flows, and that being ſalt and impure is obſtructed in Perſpiration, *Spaſmodick Contractions* are made in the Habit of the Body, and the whole Maſs of Humours repell'd to the inward Parts; from whence by a large Flux of Humours the Mouth of the Glands are relaxed, and ſo abundance of vitious *Serum* is evacuated with Advantage; hence *ſore Mouths*, *Cough* and *Catarrhs*, prognoſticate Health, becauſe they free the Body from a *Superfluous*, *Salt Serum*.

Plenty of *acrid Bile* and *Lympha*, thrown upon the Guts and Stomach, or of acrid viſcous Humours, excites vomiting by offending the nervous, muſcular Tunicles of thoſe Part, or elſe a critical *Flux*, which is not ſtopt without ſome danger. The *Lympha* being very *acrid*, *cauſtick* and *putrid* in the *Small pox*, or ſomething milder in the *Meaſles*, and likewiſe the *viſcid Tartar* that is in Rheumatick Diſeaſes, diſturbs the whole *fibrous* and *muſcular Genus*, and inwardly produces ſtrong *ſpaſmodick* Conſtrictions: From whence we have *Heart-burn*, *Vomiting*, *Diarrhea*, *Trembling*, *Cold*, &c. but theſe diſmal *Symptoms* will diſappear in the *Spaſms* of a Fever, wherein the Excretions are perform'd vigorouſly.

In Inflammations, the Blood being pent up in the Veſſels, hinders the Freedom of Circulation, where finding no way to return, it diſtends the Veſſels and preſſes upon the Fibres; from whence in the firſt place, comes a *Spaſm*, by and by from the *Spaſm* a *Fever*, which in like manner, ſucceſſively reſolves Obſtructions in the Parts affected, looſens the Coagulation of the Blood, and ſo frees the Body from a great Oppreſſion; but all acuter Pains have for their Attendance a *feveriſh* Commotion in the Blood, which afterwards are reliev'd by giving a free Circulation to the *Fluids.*

From theſe things we may be ſufficiently taught and inſtructed, that Nature is the beſt Phyſician; therefore in her method of Cure, ſhe hath always regard to the Parts firſt affected, and 'tis the Phyſician's Buſineſs to follow that Rule, and by no means hinder, but rather forward her laudable Deſigns, at leaſt imitate them; for the Phyſician is not Maſter but the Miniſter of Nature, ſhe is Director, he a Servant.

But this ought to be obſerv'd in ſpaſmodick and acute Diſeaſes, to carry off the vicious Matter, if it offend in quantity, or ſwell the Parts, which may be done at firſt without diminution of Strength by Phlebotomy, Purgatives and Emeticks, which are to be prudently and ſparingly us'd in the Termination or Ending of a Diſeaſe, but not to be neglected upon the firſt *Acceſſion*; for it is much eaſier to relieve Nature of a Burden that hath been but juſt laid upon her, than aſſiſt her when the Diſeaſe hath had its full Scope; from whence the correcting of a vicious Quality is of great difficulty; for there are but few Medicines, that will change the Nature and Subſtance of the offending Matter; but the Humours are to be diluted and thicken'd, from whence too irregular a Motion is to be allay'd and temper'd; and Evacuation is much better promoted by a mild and gentle Motion; for if Nature is deficient in expelling, or if it is weak, then ſhe is to be corroborated with *Analepticks* and ſtimulated by *Alexipharmicks* and *Cardiacks,* which ought to be done about the critical time of Excretion.

This method chiefly obtains in *acute Fevers,* when there is no contending with multiplicity of Medicines, but Patience, Obſervation and a prudent

Regimen avail more than all the pompous and labour'd Preparations of the Shops. 'Tis a wiſe and antient Saying, that the Phyſician ought to be either a *Spectator*, an *Aſſiſtant* or *Actor* in a Diſeaſe, or at leaſt he ought to imitate Nature if poſſible.

He ought to be a *Spectator* in *acute Diſeaſes*, where the offending Matter is not ſo malignant, but the Vigour of Nature gently performs the Secretions; ſo *ſmall Pox*, *Meaſles*, *Catarrrhs*, *gouty* and *rheumatick Fevers*, *St. Anthony's Fire*, *Diarrhea's* and other Excretions, do not always require the *Phyſician's* Aſſiſtance, but they are often ſucceſsfully cured by the Strength of Nature; here ſhe prevails over Art, ſo that the latter wou'd rather interrupt than aſſiſt her in a Work of her own Power; therefore it is better that the Phyſician be here a *Spectator*, than too buſy an *Actor*.

But when the offending peccant Matter is of a worſe and more malignant Nature, ſo that it raiſes *ſymptomatick* Commotions in the *genus nervoſum*, that the Excretions of all kinds are diſturbed, then Nature is to be aſſiſted; which is to be purſued till the ill quality of the Matter be temper'd, corrected and fitted for a Diſcharge or Evacuation, and the irregular fruſtraneous Motions quieted and allay'd; ſuch as theſe are which frequently happen in all kinds of *Spaſms*, *inflammatory Pains*, *periodical* and *malignant Fevers*.

A Phyſician ought to imitate Nature, if ſhe be ſlothful and unactive, or elſe there be a Deficiency in Motion and ſhe is not able to perform her Functions, that is, if there be a preternatural quantity of Blood and Humours, then Phlebotomy is profitable for exciting the Motion of the Fluids and increaſing the Secretions and Excretions, and this ought to be done in Pleureſies, Angina's, eryſipelated and all periodical Fevers, Aſthma, Scurvy, Palſy, Convulſion, *&c.* where the Phyſician's Skill and Application is needful, Nature not being ſufficiently able to help herſelf.

'Tis obſervable in general, that Nature in *acute Diſeaſes*, and in the *Paroxiſms* of chronick ones, performs more than Art, but Art excels Nature in removing the chronick. Now if I ſhould fix upon a Claſs of thoſe Medicines which are moſt efficacious in curing chronical Diſeaſes, it would appear plain, they relieve no otherwiſe than as they increaſe the Motion in the *Fluids* and *Solids* of the Body, and render them more intenſe.

Theſe things are exemplified in the Decoctions of the Reſinuous and Alexipharmick Woods and Roots, and in ſome Preparations of *Mercury* and *Antimony*, which being apply'd with a judicious Hand, happily and ſucceſsfully break the Force and Virulence of the Venereal Diſeaſe with its worſt *Symptoms*.

And there is no other Cauſe than this, that theſe Medicines act upon the *Solids*, that is, the moving Fibres, by ſtimulating the Motion of the *Fluids* thro' the whole Syſtem of the glandulous Pipes; ſo Obſtructions are removed, the tenacious viſcid Matter diſcuſs'd, and the putrid *Sordes* or Filth of the Body evacuated by the ſalivatory Glands and the other Emunctories. Medicines from the vegetable, alcalious, volatile Salts and Spirits work kindly with Nature, becauſe they aſſiſt the Motion of the Blood and Humours, and puſh them on to their neceſſary Excretions; ſo the lixiviate, bitter and balſamick relieve *Dropſies* and *Oedematous* Tumours.

The Effects of the *Acidulæ* and *Bath-waters* are wonderful in diſſolving Obſtructions in the *Hypochondria's*; in removing viſcid pituitous *Aſthma's*, *Arthritick* and *Tartarous* Diſeaſes, but this Operation depends only on an intenſer Motion, which they introduce into the Fluids; the mineral Particles of the Water ſtimulating the *Emunctories* and Strainers of the Glands. The Uſe of *Chalibeates*, is not of the leaſt moment in Affections of the lower Region of the Belly, and where the Force and Strength of the *Viſcera* are loſt, and there is a Stoppage of Blood and *Serum*, nor is it according to the Opinion of ſome that *Acrids* perform ſuch Cures by abſorbing the vitiated *Serum*, and precipitating the *Fæces*, but it is done only by the Increaſe of Motion which they bring to the *Fluids*, from whence, by the Uſe of them, the *Pulſe* is made quicker, the Face more lively in Colour, and the Appetite is ſtrongly raiſed.

Emeticks circumſpectly adminiſtred, relieve obſtinate Diſeaſes, not only by Evacuation, but by that Commotion they raiſe in the *Genus nervoſum*, by which means it comes to paſs that the peccant Matter is diſturbed and removed from its former Lodgment; ſo ſtrong *Catharticks* if they agree with the Body, make the *Pulſe* quicker, increaſe Heat, and produce an Intenſeneſs of *Thirſt*.

From which things it is clearly manifeſt, that the Phyſician ought to adminiſter and diſpenſe his Medicines purely mechanical; for where the Motions proceed well and regularly, they are to be continued ſo, and not diſturb'd; if they are too ſtrong, they are to be moderated; if too weak and languid, they are to be rais'd and encouraged, on the Management of which the Foundation of Practice turns.

But further Experience teaches us, that *Spring* and *Summer* time when the Air is ſerene and temperate, gives much more Aſſiſtance to the Cure of Chronicks, than *Autumn* and Winter, becauſe the Motion of the Blood, and the Excretion of the ſuperfluous Humours is then greateſt; ſuch Obſervations as theſe wonderfully ſecond the Operations of Medicines, which is made under a languid Motion. But the Antients us'd wiſely to take notice of a good or bad Conſtitution, and to proceed accordingly; a good Conſtitution proceeds from the Strength and Vigour of the Fibres and a due Perſpiration; a bad one from the difficult Procedure of the Excretions, a Want of Strength, or the Viciouſneſs of the Fluids.

That Phyſician errs who prepoſterouſly ſtops the *ſalutary* Motions of Nature, which are endeavoring to perform their own Work, ſuch as are made from a quantity of matter ſecerned, ſo likewiſe when he thickens the Humours and leſſens the Excretions; for which reaſon 'tis wonderful to obſerve how much Phyſicians miſtake in giving *Anodynes*, *Opiates*, *Steels*, *Aſtringents* and other incraſſating things. They offend againſt common Reaſon, who, where the Motions are exceſſive, uſe ſtrong *Sudorificks* and *ſtimulating Evacuatives*; they are notoriouſly to blame, who, where Strength is deficient, exhauſt it the more by Purging; and thoſe are equally blameable, who, in an apparent want of Blood, uſe Phlebotomy, *&c.* nor are thoſe to be commended, who have not that due regard to *Plenitude*, as to make neceſſary *Evacuations*, eſpecially in the beginning of *acute Diſeaſes* and out of the *Paroxyſm* in *Spaſmodick*, as Convulſions, *&c.*

They are liable to the ſame Cenſure, who, before Evacuation, treat the *Plethorick* and *Cachymick* with forcible Medicines that raiſe Commotions in the Body, and thoſe who uſe *Aſtringents* where there is a great Torture and Contraction of the Fibres, who in great Solutions or Relaxations of the Tone, apply cold, moiſt, nitrous Medicines.

They who ſuppreſs *critical Excretions*, either by internal cooling Anodynes, or elſe ſtop the Pores by external Aſtringents, are as ignorant as they who in the *Hemorrhoidal Fluxes*, and the *Menſtrua* have no regard to Circumſtances. They who in *acute Diseaſes*, go too precipitately to work, not obſerving critical Times and Seaſons, they compel Nature to Excretion.

But they offend moſt of all, who uſe great quantities of Medicine where few will do, for theſe neither underſtand the Diſeaſe, the Patient nor the Remedy; for there are but few that a Phyſician need to uſe, nay very few, whoſe Virtues and Doſes are truly known and thoroughly try'd, therefore he ought to take heed that he apply but few, and that thoſe be choice and well prepared.

They miſtake the Matter wide, who in Healing have not reſpect to the firſt Seat of the Diſeaſe, and they as little in the right, who know not how prudently to correct the vicious Diſorder without injuring or deſtroying the Tone of the *Stomach* and *Inteſtines*; laſtly, they muſt be thought unworthy the Name of a Phyſician, who cannot diſtinguiſh the *Symptoms* from the Diſeaſe, and know what things are done by Conſent, and what are the Effects of the morbifick Cauſes, but proceeds to cure *palliatively*, by attempting to remove the Effects, without underſtanding to eradicate the Cauſe.

FINIS.

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